

IBM TotalStorage Enterprise Storage Server



Application Programming Interface Reference

IBM TotalStorage Enterprise Storage Server



Application Programming Interface Reference

Note:

Before using this information and the product it supports, read the information in “Notices” on page 241.

First Edition (November 2003)

This edition replaces GC35-0485-00.

© Copyright International Business Machines Corporation 2003. All rights reserved.

US Government Users Restricted Rights – Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

Contents

About this guide	vii
Who should use this guide.	vii
Conventions used in this guide	viii
How to send your comments.	viii
Related information	viii
ESS library	ix
Other IBM publications	x
Ordering IBM publications	xvii
Non-IBM publications	xvii
Web sites	xviii
 Chapter 1. Introduction	1
ESS API overview	1
CIM Agent overview	1
CIM Agent components	3
CIM concepts	3
ESS CIM Agent installation requirements.	4
Hardware	5
Workstation space	5
Software.	5
ESS CIM Agent installation methods	6
ESS CIM Agent security	6
 Chapter 2. CIM Agent on AIX	7
Installation overview for AIX	7
Installing the ESS CLI on AIX	7
Mounting the CD on AIX	9
Installing the CIM Agent on AIX in graphical mode	10
Installing the CIM Agent on AIX in unattended (silent) mode	19
Verifying the CIM Agent installation on AIX.	21
Configuring the CIM Agent on AIX	22
Configuring the CIM Agent to run in unsecure mode	25
Verifying connection to the ESS.	26
Removing the CIM Agent on AIX	27
Removing in graphical mode	28
Removing in unattended (silent) mode	31
 Chapter 3. CIM Agent for Linux	33
Installation overview for Linux	33
Installing the ESS CLI on Linux	33
Installing the CIM Agent on Linux in graphical mode	35
Installing the CIM Agent on Linux in unattended (silent) mode	43
Verifying the CIM Agent installation on Linux	47
Configuring the CIM Agent on Linux	48
Configuring the CIM Agent to run in unsecure mode on Linux.	50
Verifying connection to the ESS.	51
Removing the CIM Agent on Linux.	52
Removing in graphical mode	53
Removing in unattended (silent) mode	57
 Chapter 4. ESS CIM Agent for Windows	59
Installation overview for Windows	59
Installing the ESS CLI for Windows	60

Installing the ESS CIM Agent on Windows in graphical mode	61
Installing the ESS CIM Agent on Windows in unattended (silent) mode	69
Verifying the ESS CIM Agent Windows installation	71
Configuring the ESS CIM Agent for Windows	72
Configuring the ESS CIM Agent to run in unsecure mode	75
Verifying connection to the ESS.	76
Removing the ESS CIM Agent for Windows	80

Chapter 5. CIM Agent installation and configuration commands 85

Overview of the CIM Agent commands and subcommands.	85
Description of commands	85
Invoking the CIM Agent.	86
Conventions used in this chapter	86
Syntax diagrams	86
Special characters	87
Emphasis	88
Anatomy of a command line	88
Configuration commands	88
Description of subcommands.	89
setuser	90
adduser	91
chuser	92
lsuser	93
rmuser	94
setentry	95
setoutput	96
setdevice	97
address	98
addressserver	100
chess	102
chessserver	104
lssess	106
lssessserver	107
rmess	108
rmessserver	109
setentry	110
setoutput.	111
Operational commands	112
startcimom	113
stopcimom	114
Utility commands.	115
mkcertificate	116
slpd	117
verifyconfig	118
modifyconfig	119

Appendix A. ESS API component definitions 121

Appendix B. CIM Agent communication with the ESS API 123

CIM Agent communication concepts	123
CIM Agent Communication methods	124
CIM Agent Functional Groups	134
Error codes returned by the CIMOM	135

Appendix C. CIM Agent class information for the ESS API 139

CIM Agent class definitions quick reference	139
---	-----

ESS API class definitions	145
ESS class definition schemas	214

Appendix D. ESS API support for Microsoft Volume Shadow Copy Service for Windows

ESS API Support for Microsoft's Volume Shadow Copy Service Overview	223
ESS API support for Microsoft Volume Shadow Copy Service installation overview	224
ESS API support for Microsoft Volume Shadow Copy Service installation requirements	224
Hardware	224
Software	225
Installing ESS API support for Microsoft Volume Shadow Copy Service on Windows	225
Verifying ESS API support for Microsoft Volume Shadow Copy Service Windows installation	234
Creating the VSS_FREE and VSS_RESERVED pools	235
Verifying ESS API support for Microsoft Volume Shadow Copy Service Windows configuration	235
ESS API support for Microsoft Volume Shadow Copy Service reconfiguration commands	236
Error codes returned by Microsoft Volume Shadow Copy Service	238
Uninstalling ESS API support for Microsoft Volume Shadow Copy Service on Windows	240
Notices	241
Trademarks.	242
Java Compatibility logo	243
Glossary	245
Index	257

About this guide

This publication introduces the IBM® TotalStorage™ Enterprise Storage Server™ (ESS) Application Programming Interface (API) and provides instructions for installing and configuring the Common Information Model Agent (CIM Agent) on the following operating systems:

- IBM Advanced Interactive Executive (AIX®)
- Linux
- Microsoft® Windows® 2000 or later

You can install the ESS CIM Agent on a host server or on a workstation within a network.

This publication also lists the components of the Common Information Model (CIM) and provides descriptions of the commands that you use during the installation and configuration tasks.

Once the ESS CIM Agent is installed and configured on your machine, you can implement the ESS API. Reference material in the appendixes includes the following information that might assist you in writing your CIM-based applications for the ESS API:

- ESS API component definitions
This appendix describes the elements, the namespace, and the object name for the ESS API.
- CIM Agent communication with the ESS API
This appendix describes the concepts and methods for communication between the ESS CIM Agent and the ESS API and lists error codes that the CIM object manager (CIMOM) returns.
- ESS API object classes
This appendix provides ESS API object classes that are used by the ESS CIM Agent to manage its model of the ESS. A visual representation of the ESS API architecture for the ESS is also included.
- ESS API support for Microsoft Volume Shadow Copy Service Overview
This appendix provides instructions for installing and configuring Microsoft Volume Shadow Copy Service on Windows. Microsoft Volume Shadow Copy Service is used by the ESS CIM Agent for FlashCopy.

Note: See the IBM TotalStorage ESS Interoperability Web site for the availability of Microsoft Volume Shadow Copy Service.

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

Who should use this guide


This publication is for system administrators and system and application programmers, or whoever is responsible for implementing the ESS API and installing and configuring the ESS CIM Agent. This publication assumes that you understand the general concepts of the operating system and Internet capabilities for your enterprise.

Reference material for application programmers who write CIM-based ESS API applications is in the appendixes.

Conventions used in this guide

This guide uses bold, italic, and other typographic styles to highlight various types of information in the text. See Table 1 for a list of conventions.

Table 1. Conventions used in this guide

bold	Denotes a command, user ID, password, or labels on buttons.
<i>italics</i>	Denotes titles of other manuals or books.
monospace	Denotes a Web address that needs to be typed in. Also denotes an example.
	Used to show the screen output you should see.
Note	Introduces special considerations about the current topic.
(>) greater than and (<) less than	Shows the optional and substitution parameters in the description of commands. The explanation of the optional or substitution parameters are included following the word "Where."

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 or fax

Fill out the Readers' Comments form (RCF) at the back of this book. Return it by mail or fax (1-800-426-6209), or give it to an IBM representative. If the RCF has been removed, you can address your comments to:

International Business Machines Corporation
Information Development
Department 61c
9000 South Rita road
Tucson, AZ 85775-4401
U.S.A.

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 xvii for information about how to order publications in the IBM TotalStorage ESS publication library. See “How to send your comments” on page viii 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 xvii for information about ordering these and other IBM publications.

Title	Description	Order Number
<i>IBM TotalStorage Enterprise Storage Server: Command-Line Interfaces User's Guide</i>	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.)
<i>IBM TotalStorage Enterprise Storage Server: Configuration Planner for Open-Systems Hosts</i>	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.)
<i>IBM TotalStorage Enterprise Storage Server: Configuration Planner for S/390 and IBM @server zSeries Hosts</i>	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.)
<i>IBM TotalStorage Enterprise Storage Server: Host Systems Attachment Guide</i>	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.)
<i>IBM 2105 TotalStorage Enterprise Storage Server: DFSMS Software Support Reference</i>	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.)
<i>IBM TotalStorage Enterprise Storage Server: Introduction and Planning Guide</i>	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

Title	Description	Order Number
<i>IBM TotalStorage Enterprise Storage Server: Quick Configuration Guide</i>	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
<i>IBM TotalStorage Enterprise Storage Server: S/390 Command Reference</i>	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
<i>IBM TotalStorage Storage Solutions Safety Notices</i>	This publication provides translations of the danger notices and caution notices that IBM uses in ESS publications.	GC26-7229
<i>IBM TotalStorage Enterprise Storage Server: SCSI Command Reference</i>	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
<i>Subsystem Device Driver's User's Guide for IBM TotalStorage Enterprise Storage Server and IBM TotalStorage SAN Volume Controller</i>	<p>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.</p> <p>For information about SDD, go to the following Web site:</p> <p>http://www-1.ibm.com/servers/storage/support/software/sdd.html</p>	SC26-7540
<i>IBM TotalStorage Enterprise Storage Server: User's Guide</i>	This guide provides instructions for setting up and operating the ESS and for analyzing problems.	SC26-7445 (See Note.)
<i>IBM TotalStorage Enterprise Storage Server: Web Interface User's Guide</i>	This guide provides instructions for using the two ESS Web interfaces, ESS Specialist and ESS Copy Services.	SC26-7448 (See Note.)
<i>IBM TotalStorage Common Information Model Agent for the Enterprise Storage Server: Installation and Configuration Guide</i>	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
<i>IBM TotalStorage Enterprise Storage Server Application Programming Interfaces Reference</i>	This publication introduces 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
<p>Note: No hardcopy book is produced for this publication. However, a PDF file is available from the following Web site:</p> <p>http://www-1.ibm.com/servers/storage/support/disk//2105.html</p>		

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 xvii for information about ordering these and other IBM publications.

Title	Description	Order Number
Data-copy services		
<i>z/OS DFSMS Advanced Copy Services</i>	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
<i>DFSMS/MVS V1: Remote Copy Guide and Reference</i>	This publication provides guidelines for using remote copy functions with S/390 and zSeries hosts.	SC35-0169
<i>IBM Enterprise Storage Server</i>	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
<i>Implementing Copy Services On S/390</i>	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
<i>IBM TotalStorage ESS Implementing Copy Services in an Open Environment</i>	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, Open VMS, 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		
<i>Fibre Channel Connection (FICON) I/O Interface: Physical Layer</i>	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: www.ibm.com/servers/resourcelink/	SA24-7172
<i>Fibre-channel Subsystem Installation Guide</i>	This publication tells you how to attach the IBM xSeries™ 430 and NUMA-Q® host systems with fibre-channel adapters to the ESS. Contact your sales representative to obtain this publication.	No order number
<i>Fibre Transport Services (FTS): Physical and Configuration Planning Guide</i>	This publication provides information about fibre-optic and ESCON-trunking systems.	GA22-7234
<i>IBM SAN Fibre Channel Managed Hub: 3534 Service Guide</i>	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

Title	Description	Order Number
<i>IBM SAN Fibre Channel Managed Hub: 3534 User's Guide</i>	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
<i>IBM SAN Fibre Channel Switch: 2109 Model S08 Installation and Service Guide</i>	This guide describes how to install and maintain the IBM SAN Fibre Channel Switch 2109 Model S08. To get a copy of this guide, go to the following Web site: www.ibm.com/storage/fcswitch/	SC26-7350
<i>IBM SAN Fibre Channel Switch: 2109 Model S08 User's Guide</i>	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. To get a copy of this guide, go to the following Web site: www.ibm.com/storage/fcswitch/	SC26-7349
<i>IBM SAN Fibre Channel Switch: 2109 Model S16 Installation and Service Guide</i>	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. To get a copy of this guide, go to the following Web site: www.ibm.com/storage/fcswitch/	SC26-7352
<i>IBM SAN Fibre Channel Switch: 2109 Model S16 User's Guide</i>	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. To get a copy of this guide, go to the following Web site: www.ibm.com/storage/fcswitch/	SC26-7351
<i>Implementing Fibre Channel Attachment on the ESS</i>	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		
<i>ESA/390: ESCON I/O Interface</i>	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
<i>ESS Solutions for Open Systems Storage: Compaq AlphaServer, HP, and Sun</i>	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 Open VMS 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

Title	Description	Order Number
<i>Fibre-channel Subsystem Installation Guide</i>	This publication tells you how to attach the IBM xSeries 430 and NUMA-Q host systems with fibre-channel adapters to the ESS. Contact your sales representative to obtain this publication.	No order number
<i>IBM TotalStorage ESS Implementing Copy Services in an Open Environment</i>	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
<i>Implementing Fibre Channel Attachment on the ESS</i>	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		
<i>Device Support Facilities: User's Guide and Reference</i>	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
<i>z/OS Advanced Copy Services</i>	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
<i>DFSMS/MVS V1: Remote Copy Guide and Reference</i>	This publication provides guidelines for using remote copy functions with S/390 and zSeries hosts.	SC35-0169
<i>ESA/390: ESCON I/O Interface</i>	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
<i>Fibre Transport Services (FTS): Physical and Configuration Planning Guide</i>	This publication provides information about fibre-optic and ESCON-trunking systems.	GA22-7234

Title	Description	Order Number
<i>Implementing ESS Copy Services on S/390</i>	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
<i>ES/9000, ES/3090: IOCP User Guide Volume A04</i>	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
<i>IOCP User's Guide, IBM @server zSeries</i>	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: www.ibm.com/servers/resourceink/	SB10-7029
<i>S/390: Input/Output Configuration Program User's Guide and ESCON Channel-to-Channel Reference</i>	This publication describes the Input/Output Configuration Program that supports ESCON architecture and the ESCON multiple image facility.	GC38-0401
<i>IBM z/OS Hardware Configuration Definition User's Guide</i>	This guide provides conceptual and procedural information to help you use the z/OS Hardware Configuration Definition (HCD) application. It also explains: <ul style="list-style-type: none"> • How to migrate existing IOCP/MVSCP definitions • How to use HCD to dynamically activate a new configuration • How to resolve problems in conjunction with MVS/ESA HCD 	SC33-7988
<i>OS/390: Hardware Configuration Definition User's Guide</i>	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
<i>OS/390 V2R10.0: MVS System Messages Volume 1 (ABA - ASA)</i>	This publication lists OS/390 MVS™ system messages ABA to ASA.	GC28-1784
<i>Using IBM 3390 Direct Access Storage in a VM Environment</i>	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
<i>Using IBM 3390 Direct Access Storage in a VSE Environment</i>	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
<i>Using IBM 3390 Direct Access Storage in an MVS Environment</i>	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

Title	Description	Order Number
<i>z/Architecture Principles of Operation</i>	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
SAN		
<i>IBM OS/390 Hardware Configuration Definition User's Guide</i>	<p>This guide explains how to use the Hardware Configuration Data application to perform the following tasks:</p> <ul style="list-style-type: none"> • Define new hardware configurations • View and modify existing hardware configurations • Activate configurations • Query supported hardware • Maintain input/output definition files (IODFs) • Compare two IODFs or compare an IODF with an actual configuration • Print reports of configurations • Create graphical reports of a configuration • Migrate existing configuration data 	SC28-1848
<i>IBM SAN Fibre Channel Managed Hub: 3534 Service Guide</i>	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
<i>IBM SAN Fibre Channel Managed Hub: 3534 User's Guide</i>	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
<i>IBM SAN Fibre Channel Switch: 2109 Model S08 Installation and Service Guide</i>	<p>This guide describes how to install and maintain the IBM SAN Fibre Channel Switch 2109 Model S08.</p> <p>To get a copy of this guide, go to the following Web site:</p> <p>www.ibm.com/storage/fcswitch/</p>	SC26-7350
<i>IBM SAN Fibre Channel Switch: 2109 Model S08 User's Guide</i>	<p>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).</p> <p>To get a copy of this guide, go to the following Web site:</p> <p>www.ibm.com/storage/fcswitch/</p>	SC26-7349
<i>IBM SAN Fibre Channel Switch: 2109 Model S16 Installation and Service Guide</i>	<p>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.</p> <p>To get a copy of this guide, go to the following Web site:</p> <p>www.ibm.com/storage/fcswitch/</p>	SC26-7352

Title	Description	Order Number
<i>IBM SAN Fibre Channel Switch: 2109 Model S16 User's Guide</i>	<p>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.</p> <p>To get a copy of this guide, go to the following Web site:</p> <p>www.ibm.com/storage/fcswitch/</p>	SC26-7351
<i>Implementing Fibre Channel Attachment on the ESS</i>	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
Seascope family		
<i>IBM Enterprise Storage Server</i>	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
<i>IBM Enterprise Storage Server Performance Monitoring and Tuning Guide</i>	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
<i>IBM Versatile Storage Server: Introduction and Planning Guide</i>	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
<i>Implementing the IBM Enterprise Storage Server in Your Environment</i>	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		
<i>Device Support Facilities: User's Guide and Reference</i>	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
<i>IBM TotalStorage Solutions Handbook</i>	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
<i>IBM TotalStorage Expert: Hands-On Usage Guide</i>	This guide, from the IBM International Technical Support Organization, helps you install, tailor, configure, and use TotalStorage ESS Expert.	SG24-6102
<i>IBM TotalStorage Expert Installation Guide</i>	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

Title	Description	Order Number
<i>Using IBM 3390 Direct Access Storage in a VM Environment</i>	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
<i>Using IBM 3390 Direct Access Storage in a VSE Environment</i>	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
<i>Using IBM 3390 Direct Access Storage in an MVS Environment</i>	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
<i>Quick Start Guide: An Example with Network File System (NFS)</i>	This guide tells you how to configure the Veritas Cluster Server. See also the companion document, <i>Veritas Cluster Server User's Guide</i> .

Title	Description
<i>Veritas Cluster Server Installation Guide</i>	This guide tells you how to install the Veritas Cluster Server. See also the companion document, <i>Veritas Cluster Server Release Notes</i> .
<i>Veritas Cluster Server Release Notes</i>	These release notes tell you how to install the Veritas Cluster Server. See also the companion document, <i>Veritas Cluster Server Installation Guide</i> .
<i>Veritas Cluster Server User's Guide</i>	This guide tells you how to configure the Veritas Cluster Server. See also the companion document, <i>Quick Start Guide: An Example with Network File System (NFS)</i> .
<i>Veritas Volume Manager Hardware Notes</i>	These hardware notes tell you how to implement multiple paths dynamically.
<i>Veritas Volume Manager Installation Guide</i>	This guide tells you how to install VxVM.
<i>Veritas Volume Manager Storage Administrators Guide</i>	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/escli.html
ESS publications	http://www-1.ibm.com/servers/storage/support/disk/2105.html Click Documentation .
Host system models, operating systems, and adapters that the ESS supports	http://www-1.ibm.com/servers/storage/support/disk/2105.html 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/
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/
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/

Chapter 1. Introduction

This chapter provides the following information about the IBM TotalStorage Enterprise Storage Server Application Programming Interface (ESS API), Common Information Model (CIM) standards, and CIM Agent installation:

- ESS API overview
- CIM Agent overview
- CIM Agent components
- CIM concepts
- ESS CIM Agent installation requirements
- ESS CIM Agent installation methods
- ESS CIM Agent security

ESS API overview

The ESS API is a nonproprietary storage management client application that supports routine LUN management activities, such as LUN creation, mapping, and masking and supports the creation or deletion of RAID5 and RAID10 volume spaces. The ESS API also enables Copy Services configuration and use activities, such as FlashCopy, with support for Microsoft Volume Shadow Copy Service, and PPRC. The ESS API supports these activities through the use of the Storage Management Initiative Specification (SMIS), as defined by the Storage Networking Industry Association (SNIA). See Appendix D, “ESS API support for Microsoft Volume Shadow Copy Service for Windows,” on page 223 for more information.

The ESS API helps integrate ESS configuration management support into storage resource management (SRM) applications, which allow customers to benefit from existing SRM applications and infrastructures. The ESS API also enables the automation of configuration management through customer-written applications. Either way, the ESS API presents another option for managing ESSs by complementing the use of the IBM TotalStorage Enterprise Storage Server Specialist web-based interface, the ESS command-line interface, and the Copy Services command-line interface.

You must implement the ESS API through the IBM TotalStorage Common Information Model Agent (CIM Agent), a middleware application that provides a CIM-compliant interface. The ESS API uses the CIM technology to manage proprietary devices as open system devices through storage management applications. The ESS API allows these storage management applications to communicate with an ESS.

The CIM Agent is available for the AIX, Linux, and Windows 2000, or later, operating system environments. The ESS API must be used on ESSs with Fibre ports.

CIM Agent overview

A Common Information Model (CIM) Agent provides a means by which a device can be managed by common building blocks rather than proprietary software. If a device is CIM-compliant, software that is also CIM-compliant can manage the device. Vendor applications can benefit from adopting the common information model because they can manage CIM-compliant devices in a common way, rather

than using device-specific programming interfaces. Using CIM, you can perform tasks in a consistent manner across devices and vendor applications.

A CIM agent consists of the components shown in Figure 1. The main components are the CIM object manager (CIMOM), the service location protocol (SLP) and the device provider. A device can be a storage server such as your IBM Enterprise Storage Server (ESS). The CIM Agent registers itself with SLP to enable discovery by the Client application. The SLP is a directory service that a client application calls to locate the CIM Object Manager. The client application and the CIMOM communicate through CIM Messages. The CIMOM and device provider communicate through method calls made from the CIMOM to the provider. The device provider communicates with the device through proprietary calls.

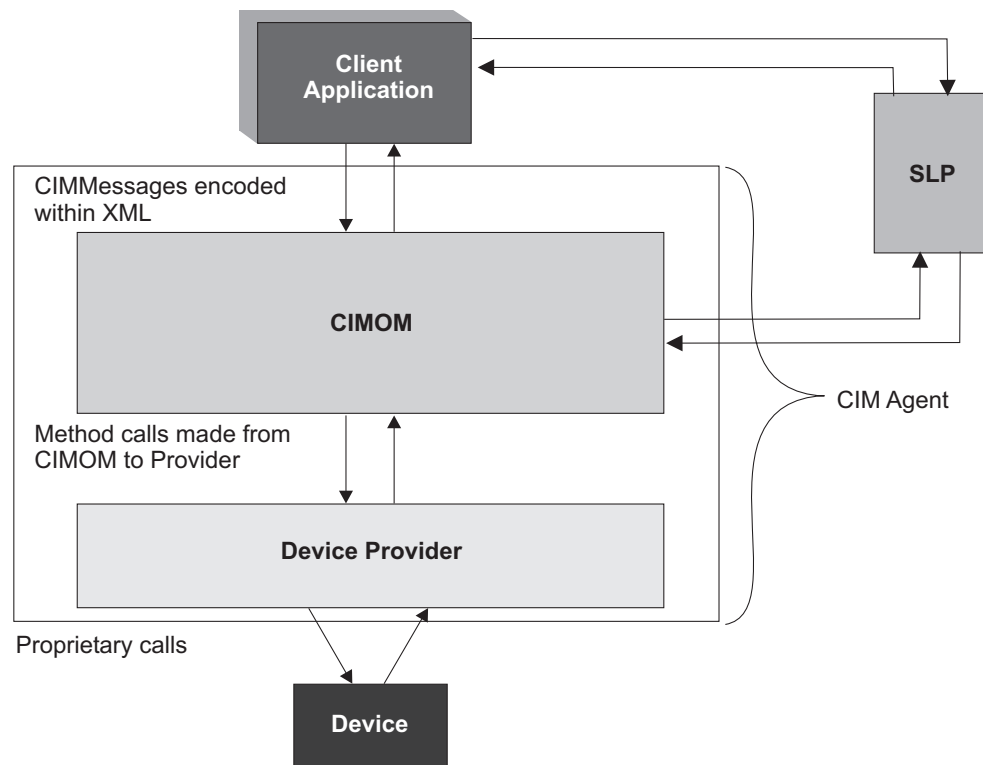


Figure 1. How a CIM Agent works

The CIMOM supports the following specifications and standards:

- *Distributed Management Task Force (DMTF) Specification for CIM Operations over HTTP, Version 1.0*

For more information about the DMTF Specification, visit the following Web site:

http://www.dmtf.org/download/spec/xmls/CIM_HTTP_Mapping10.htm

- *Common Information Model (CIM) Specification, Version 2.2*

For more information about CIM Specification and CIM standards, visit the following Web site:

http://www.dmtf.org/standards/cim_schema_v27.php

- *Storage Networking Industry Association (SNIA) Storage Management Initiative (SMI) Specification and the Shared Storage Model, a framework for describing storage architectures* (a white paper from the SNIA Technical Council)

For more information about SNIA, visit the following Web site:

<http://www.snia.org/home>

Note: You can access the white paper and other SNIA reports from this Web site. Contact SNIA regarding access to the specification.

Conformance to these specifications allows a CIM Agent to act as an open-system standards interpreter, allowing other CIM-compliant storage resource management applications (IBM and non-IBM) to interoperate with each other.

When you have installed, configured, and enabled the CIM Agent on a host server or an administrator's workstation within your network, that host server or workstation can communicate with your ESS through the CIM Agent. This allows CIM-compliant applications like the ESS API to manage the data on your ESS. See the appendixes to this guide for reference information about the ESS API.

CIM Agent components

The following list describes the components of a CIM Agent:

client application	A storage management API that initiates a request to a device or a data storage server such as an ESS
CIM Agent	An agent that interprets open-system data as it is transferred between the API and a device or a storage server.
service location protocol (SLP)	A directory service that a client application calls to locate the CIM Object Manager.
CIM object manager (CIMOM)	A common conceptual framework for data management. Receives, validates, and authenticates client application requests, then directs requests to the appropriate functional component or to a device provider.
device provider	A device-specific handler that receives client application requests that are destined for its device or storage server.
device (also known as a storage server or an ESS)	The final destination of a client application request, and the processor of the request.

CIM concepts

The common information model (CIM) is an open approach to the management of systems and networks. The CIM provides a common conceptual framework applicable to all areas of management including systems, applications, databases, networks, and devices. The CIM specification provides the language and the methodology used to describe management data.

The CIM defines a set of classes with properties and associations which in turn provide a conceptual framework. The framework enables the organization of data for a specific managed environment, such as data storage. CIM Schema 2.7 for Managing a Storage Array, provides information about enabling management applications to manage data in a common way. For more information about the CIM specifications and standards visit the following Web site:

http://www.dmtf.org/standards/cim/cim_schema_v28

The CIM standards and the DMTF specification provide information about Web-based enterprise management (WBEM) operations over HTTP. For additional information about CIM operations over HTTP, visit the following Web site:

http://www.dmtf.org/download/spec/xm1s/CIM_HTTP_Mapping10.htm

A client application finds the location of the CIMOM by calling an SLP directory service. When the CIMOM first starts, it registers itself to the SLP and provides information about its location (IP address and port) and the type of service it provides. After obtaining this information, the client application opens direct communication with the CIMOM.

A client sends requests to a CIMOM in the context of a CIM model. The model is defined by the CIM schema and loaded into the repository of the CIMOM. Figure 2 shows how the schema is loaded into the data store of the CIMOM. The managed object format (MOF) compilation and creation of the data store is handled automatically during installation.

As requests arrive, the CIMOM validates and authenticates each request. Requests are either directed to the appropriate functional component of the CIMOM or directed to a device-specific handler called a provider.

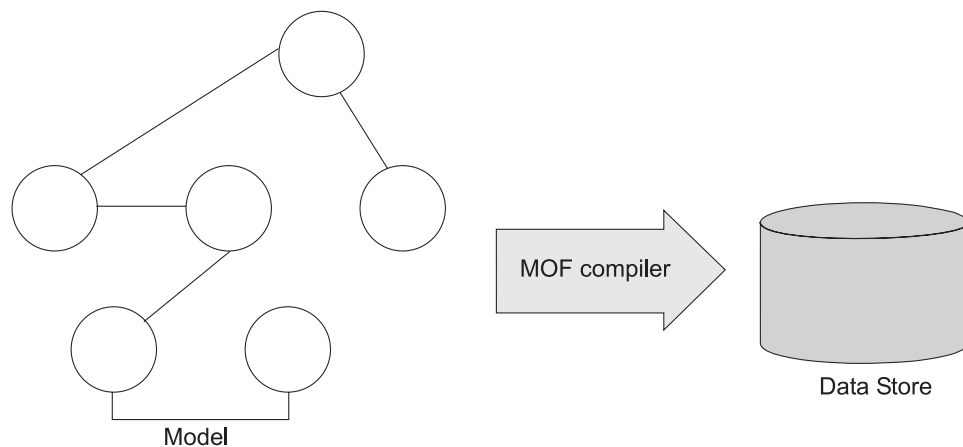


Figure 2. The MOF compiler stores the model in the CIMOM data store.

A provider makes device-unique programming interface calls on behalf of the CIMOM to satisfy a client application request. Such requests generally map a CIM request to the propriety programming interface for a device. A request to get an instance of a class or a property of an instance, for example, might be directed to a Provider and a Provider might make one or many requests of a device using the unique API for the device. Figure 1 on page 2 shows the communication protocol between the device and the client application.

ESS CIM Agent installation requirements

Ensure that your system satisfies the following prerequisites for installing the ESS CIM Agent on a Windows 2000 or later, AIX, or Linux operating system before starting the installation.

- You must install the ESS command-line interface (CLI) on your operating system *before* you install the ESS CIM Agent.

ESS CLI installation is unique for each operating system. See the appropriate chapter in this publication for the instructions for installing the ESS CLI on your operating system:

- Chapter 4, “ESS CIM Agent for Windows,” on page 59
- Chapter 2, “CIM Agent on AIX,” on page 7
- Chapter 3, “CIM Agent for Linux,” on page 33

Note: All prerequisite software must be installed before you start the installation of the ESS CIM Agent. The ESS CIM Agent installation program will check for the existence of the ESS CLI. If the program does not detect the ESS CLI, the installation of the ESS CIM Agent will not complete successfully.

Hardware

The following hardware is required:

- Personal computer, workstation, or server with Intel® Pentium® III or higher processor (Linux and Windows only)
- CD-ROM drive
- Video graphics adapter display or better

Workstation space

The following space on your workstation is required:

- 256 megabytes (MB) of random-access memory (RAM) minimum depending on your system configuration
- 1 gigabyte disk space minimum

Note: You might need to increase the total available disk space on your hard drives if the ESS CIM Agent and other associated products are split between more than one logical drive. Also, the ESS CIM Agent might require additional memory to operate if you configure it to manage many devices or devices with large configurations.

- 1 gigahertz processor speed minimum
- Up to 50 MB of temporary disk space for installation purposes

Software

The following software is required:

- Operating systems:
 - Windows 2000 or later
 - AIX 5.1 or later
 - Linux RedHat
- ESS CLI level 2.3.0.13. This software is on the *ESS CLI* CD.
- Common Information Model (CIM) Agent. This software is on the *CIM Agent for ESS* CD.
- Transmission Control Protocol/Internet Protocol (TCP/IP)
- Adobe Acrobat Reader version 4.0 or later

You need the Adobe Acrobat Reader to read License Agreement and product information from the ESS CIM Agent LaunchPad. You can download the Adobe Acrobat Reader from the following Web site:

- <http://www.adobe.com/support/downloads/main.html>

ESS CIM Agent installation methods

You can choose to install the ESS CIM Agent in graphical mode with the help of the installation Wizard or in unattended mode (also known as silent mode), which involves customizing a response file and issuing a command. Follow the instructions in the chapter appropriate for your operating system:

- Chapter 4, “ESS CIM Agent for Windows,” on page 59
- Chapter 2, “CIM Agent on AIX,” on page 7
- Chapter 3, “CIM Agent for Linux,” on page 33

ESS CIM Agent security

The ESS CIM Agent can operate in both secure and unsecure modes.

Secure mode

All requests between the client application and the CIMOM are XML encoded requests sent over Hypertext Transfer Protocol (HTTP) or HTTP over Secure Sockets Layer (SSL). The CIMOM, upon receiving a request, parses the request and processes it. Responses, when they are returned to the client application, are transformed into XML-encoded CIM status and returned in HTTP responses to the client. The default of the ESS CIM Agent is to run in secure mode using SSL.

Unsecure mode

Some vendor software might not be capable of communicating with the ESS CIM Agent in a secure mode. You can still use this vendor software by configuring the ESS CIM Agent to run with only basic user name and password security. See the configuration instructions for your operating system for the instructions for configuring the ESS CIM Agent for this less secure mode.

Chapter 2. CIM Agent on AIX

This chapter includes an overview of the installation process and instructions for installing and configuring the CIM Agent on an IBM AIX® operating system.

Installation overview for AIX

This section provides an overview and instructions for installing and configuring the CIM Agent on the AIX operating system. You should have some knowledge of how to administer AIX operating system before you begin to install the CIM Agent. You should also become familiar with the command explanations that you use to install and configure the CIM Agent. See Chapter 5, “CIM Agent installation and configuration commands,” on page 85 for information about the commands.

The following list of installation and configuration tasks are discussed in the order in which they should be performed:

1. Before you install the CIM Agent on an AIX operating system, check the hardware and software requirements listed in “ESS CIM Agent installation requirements” on page 4.
2. Install the prerequisite ESS CLI 2105 for AIX software as instructed in “Installing the ESS CLI on AIX.”

Attention: If you are upgrading from a previous version of the ESS CIM Agent, you must upgrade the ESS CLI software to the new level required which is a minimum level of 2.3.0.13.

3. You can choose to install the CIM Agent either in graphical mode with the help of a wizard or in unattended mode (also known as silent mode), which involves customizing a response file and issuing a command. To mount the CIM Agent for ESS CD for either mode, perform the instructions in “Mounting the CD on AIX” on page 9.
 - a. If you want to install the CIM Agent in graphical mode, perform the instructions in “Installing the CIM Agent on AIX in graphical mode” on page 10.
 - b. If you want to install the CIM Agent in unattended mode, perform the instructions in “Installing the CIM Agent on AIX in unattended (silent) mode” on page 19.
4. Configure the CIM Agent by performing the instructions in “Configuring the CIM Agent on AIX” on page 22. You might want to revisit this section in the future as you add, change, or delete CIMOM authentication and ESS information.
5. Enable the CIM Agent by performing the instructions in “Verifying connection to the ESS” on page 26.
6. For instructions about removing the CIM Agent, see “Removing the CIM Agent on AIX” on page 27. You only need to perform this optional task if you get errors during installation verification or if the CIM Agent did not set the environment variables.

Installing the ESS CLI on AIX

Before you install the CIM Agent, you must install the ESS CLI. The ESS CLI must be installed first because the CIM Agent sets the path information in shell scripts for you based on the location of the ESS CLI. The CIM Agent installation wizard checks your system for the existence of the ESS CLI and the wizard stops if the ESS CLI is not installed.

Steps:

Perform the following steps to install the ESS CLI for AIX:

1. Select the *ESS CLI* CD.

This ESS CLI CD contains the ESS CLI installation packages and the *IBM TotalStorage Enterprise Storage Server Command-Line Interfaces User's Guide*.

2. Insert the *ESS CLI* CD, but *do not mount* the CD device.
3. Type the following command to list the installation packages:

```
smitty install_update
```

4. Select the **Install and Update from ALL Available Software** option.
5. Use the list command (F4) to list all of the devices and then select the system's CD-ROM drive, for example, */dev/cd0 (16 Bit SCSI Multimedia CD-ROM Drive)*.
6. When you return to the panel, use the list command (F4) on the “**SOFTWARE to Install” line to list all the software on the CD-ROM.
7. Select the **ibm2105esscli** package, which is at the bottom of the list:

```
@ 2.3.0.13  IBM 2105 ESS Storage Management CLI (Includes the CS CLI)
```

Attention

There are two packages: `ibm2105esscli` and `ibm2105cli`. You *must* select and install the `ibm2105esscli` package. This package contains both the ESS CLI and the Copy Services CLI. Do *not* select the `ibm2105cli` because this file contains only the Copy Services CLI, not the ESS CLI.

The CIM Agent supports ESS CLI level 2.3.0.13.

8. Follow the installation instructions from the *IBM TotalStorage Enterprise Storage Server Command-Line Interfaces User's Guide*, which can be found on the IBM TotalStorage Enterprise Storage Server Customer Documents CD to install the ESS CLI. In this guide, the “ESS CLI” is referred to as the “Storage Management CLI”.
9. Verify that the ESS CLI is installed.

Type the following command to review the installed programs on your AIX operating system. The level of the software should be 2.3.0.13 or higher.

```
# lspp -l "ibm2105*"
```

If the ESS CLI is installed, a message similar to the following is displayed.

```
ibm2105esscli.rte  2.3.0.13  COMMITTED  IBM 2105 ESS Storage  
Management CLI (Includes the CS CLI)
```

10. Follow the instructions in “Verifying connection to the ESS” on page 26 to verify that the ESS CLI has connectivity to your ESS.
11. Verify that the ESS CLI is operational and that all the environment variables have been set.

The ESS CLI does not set the system path. You need to find where the `esscli` is installed. If you do not know where the `esscli` is installed, type the following command to find out:

```
# ls1pp -f ibm2105esscli.rte | grep esscli
```

The following example output indicates that the esscli is installed at level 2.3.0.13 in /usr/opt/ibm2105cli.

```
ibm2105esscli.rte 2.3.0.13 /usr/opt/ibm/ibm2105cli/esscli
```

Type the following command from a Command Prompt window to see a listing of the esscli commands:

```
#/usr/opt/ibm/ibm2105cli/esscli
```

The following output is an example of a listing of the esscli commands.

```
Thu Oct 09 11:46:14 PDT 2003 IBM ESSCLI 2.3.0.1

esscli -a AccessFile [-key KeyName] | -u Username -p Password
-s ServerAddress [-b BackupServer]
[-v|-nov] [-hdr|-nohdr] [-ssl|-noss] [-debug|-nodebug]
[-refresh|-norefresh] [-fmt "Format"]
Cmnd_Action Cmnd_Category [-d "argument_pairs"]

List of Cmnd_Actions, Cmnd_Categories, and argument_pairs:
=====

DiskGroup Category:
-----
list DiskGroup      [-d "ess=EssId"]
                    [-fmt server,dg,loc,raid,width,cap,rpm,dd,status]

.....lines omitted from sample.....

WebUserAccount Category:
-----
list WebUserAccount [-d "ess=EssId"]
                    [-fmt user,acclvl,iprange,comments]
create WebUserAccount -d "ess=EssId user=UserId pwd=Password
                    acclvl=AccessLevel iprange=IPRange comments='Comments'"
set WebUserAccount -d "ess=EssId user=UserId
                    (newuser=NewUserId|newpwd=NewPassword|
                    newacclvl=NewAccessLevel|newiprange=NewIPRange|
                    newcomments='NewComments')*"
delete WebUserAccount -d "ess=EssId user=UserId"

#
```

Mounting the CD on AIX

This section provides instructions about how to mount a CD.

Steps:

Perform the following steps to mount the *CIM Agent for ESS* CD.

Note: You must mount the *CIM Agent for ESS* CD for both a graphical and unattended installation.

1. Log on as a user with root authority.
2. Create a mount point or choose an existing mount point.

To create a mount point called /cdrom, type the following command:

```
# mkdir /cdrom
```

3. Type the following command to mount the CD file system at the desired mount point:

```
# mount -o ro -v cdrfs /dev/cd0 /cdrom
```

4. Change the current directory to the mount point for the CD drive in the AIX subdirectory. For example, if the CD was mounted at the /cdrom mount point, type the following command:

```
# cd /cdrom/AIX
```

Installing the CIM Agent on AIX in graphical mode

This section includes the steps to install the CIM Agent in your AIX environment using the graphical mode. You must comply with all prerequisites listed in “ESS CIM Agent installation requirements” on page 4 before you start the installation.

You can choose to install the CIM Agent in graphical mode with the help of an installation wizard or in unattended (silent) mode, which involves customizing a response file and issuing a command. If you want to install the CIM Agent in unattended mode, see “Installing the CIM Agent on AIX in unattended (silent) mode” on page 19, otherwise continue with this section. After the completion of either kind of installation, you will then verify the installation of the CIM Agent in section, “Verifying the CIM Agent installation on AIX” on page 21. Before you install the CIM Agent on AIX, you should check the hardware and software requirements listed in “ESS CIM Agent installation requirements” on page 4.

Steps:

This task will assist you with the installation of the CIM Agent in your AIX environment using the graphical mode.

Perform the following steps to install the CIM Agent on your AIX operating system:

1. Log on as a user with root authority.
2. You can run the wizard from either the main console or from a remote X server. If you run it from a remote X server, perform the following steps prior to running the wizard:
 - a. Set the DISPLAY variable to *hostname:displaynumber.screennumber* where:

hostname

The host name of the platform on which the X server runs and from which the wizard starts.

displaynumber

Use the number 0 if X server controls more than one keyboard and monitor unit, for instance, a network of X terminals.

screennumber

This specifies which monitor to use in a multiple monitor setup.

`<hostname>:<displaynumber.screennumber>`

Note: If you logged on as a root user from the AIX main console, you do not need to perform the next two substeps because the correct

settings are automatically set. However, if you did *not* log on as a root user, you will need to manually specify these settings under the following circumstances:

- 1) If you log on as a nonroot user, switch to the root user (depending on the profile of the root user).
- 2) If you log on using another computer (another UNIX machine or a PC running an X emulator), referred to as an X server, you must properly set the DISPLAY environment variable. An X server is a graphical machine that is acting as a graphical terminal for a UNIX (in this case AIX) computer through a special protocol. The application running on the AIX operating system must know the host name (or IP address), display and screen number (normally 0) of the machine acting as the X server. You make this information available to the application setting the DISPLAY environment variable (the command for this is:

```
export DISPLAY=x_server_hostname:displaynumber.screennumber
```

On its turn, the X server (if it is a UNIX machine) must be configured to allow clients running on remote hosts to access it, using the **xhost** command. The form, **xhost +**, enables any graphical application running on any machine to use the X server. Or you can use a more restrictive command, such as **xhost aix_name_or_ip**, instead.

- b. Run the following command to enable any graphical application running on any host to make connections to the X server.

```
# xhost +
```

3. The CIM Agent installation in graphical mode begins with a LaunchPad facility to launch the installation program wizard. The LaunchPad facility provides links for you to view various text files, such as the product overview, product readme, post installation tasks, and various Adobe Acrobat files, such as the Installation guide, product license agreement, and a browser link to the IBM storage product technical support page.

The Installation guide and license agreement are in Adobe Acrobat file format (.pdf). In order for the LaunchPad to provide links to the Adobe Acrobat files, your system *must* have Adobe Acrobat Reader installed. In order for the browser to link to the IBM storage product technical support page, you *must* have a browser installed on your system where you start the LaunchPad facility. If you wish to use the LaunchPad facility links to view the Adobe Acrobat files, you must have the Adobe Acrobat Reader bin location in your PATH environment variable. You can verify this by running the following command:

```
echo $PATH
```

Locate the Adobe Acrobat Reader bin location in the PATH, for example, `usr/lpp/Acrobat5/bin`. If the Adobe Acrobat Reader bin location is not in the environment path, you can set it by typing the following command:

```
export PATH=$PATH:/usr/lpp/Acrobat5/bin
```

where `/usr/lpp/Acrobat5/bin` is the location of the Adobe Acrobat Reader bin directory.

4. Run the wizard launcher, `launchpad_aix`, from the AIX directory of the CD by typing the following command:

```
# ./launchpad_aix
```

This will start the CIM Agent LaunchPad, a small program that launches the wizard.

5. Choose from the following options in the LaunchPad window:

CIM Agent overview

Offers information about the CIM Agent.

Readme file

Offers any last minute product information that did not make it into this installation guide.

Installation guide

Offers instructions on how to install the CIM Agent.

License Agreement

Offers information about the license of the CIM Agent.

CIM Agent Web site

Offers information from the product Web site.

Installation wizard

Starts the CIM Agent installation program.

Post installation tasks

Offers information about configuring the users and device communications.

Exit Exits the LaunchPad program.

The LaunchPad window remains open (behind the wizard) during the installation. You can access product information after the installation has started. The LaunchPad returns to the forefront when the installation is complete. You can click **Exit** to close the LaunchPad.

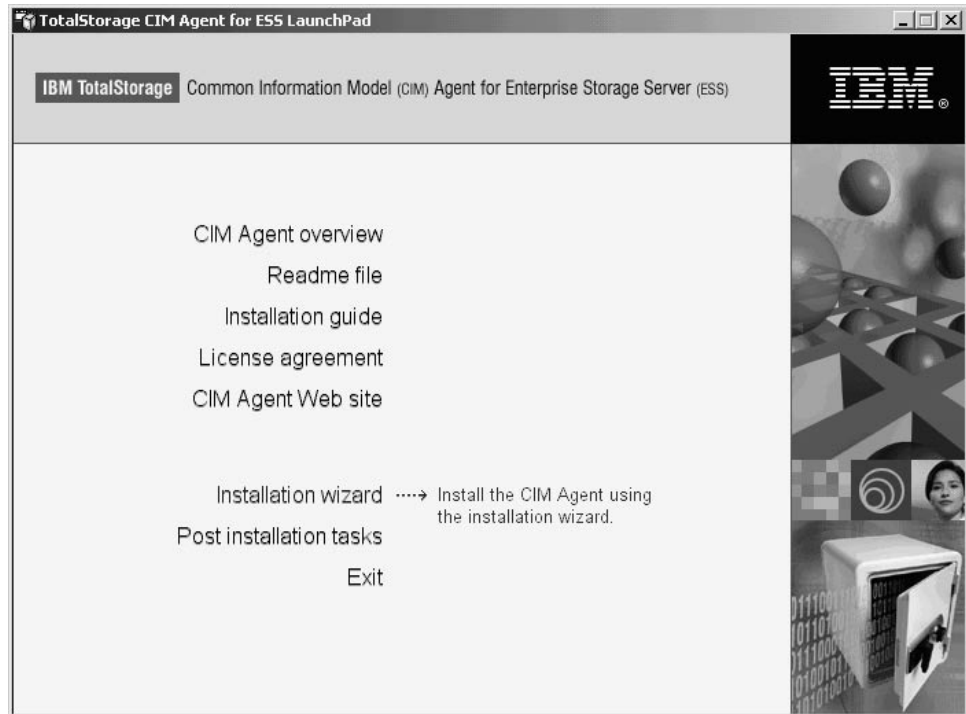
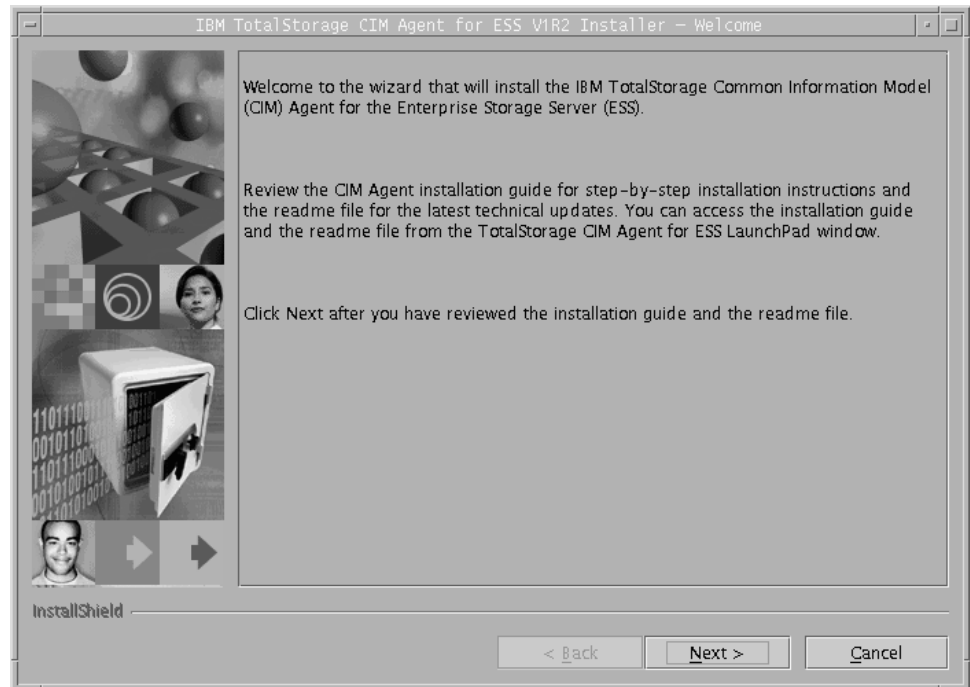


Figure 3. LaunchPad window

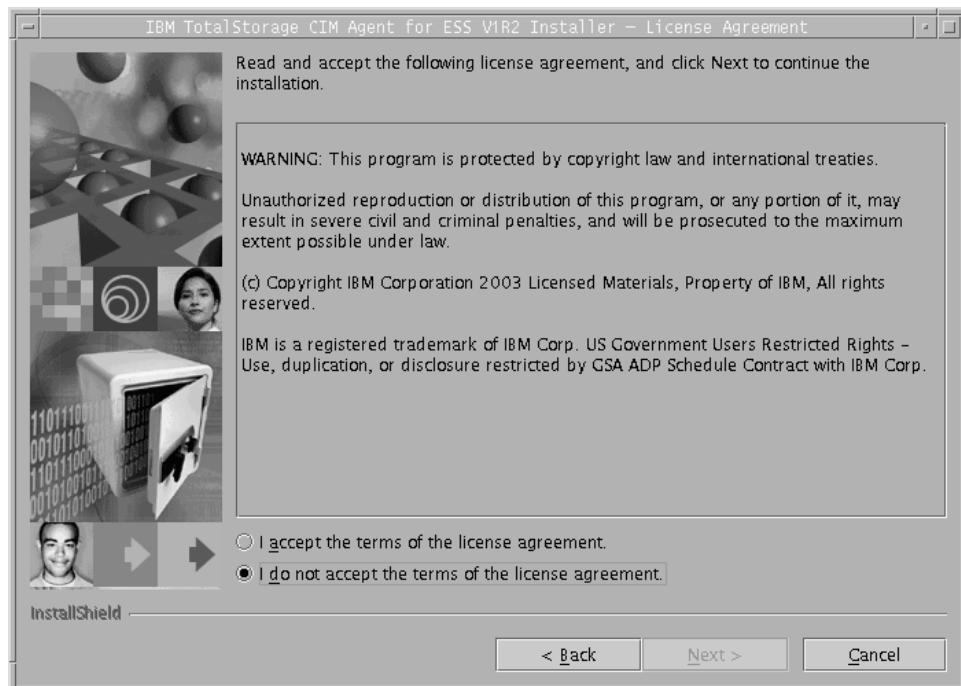
6. Check the readme file by clicking the Readme file on the LaunchPad window or by viewing the README.aix file located in the AIX directory on the CIM Agent installation CD. The readme file might provide additional information that supersedes information in this guide.

You can also find this installation guide on the CIM Agent CD under the file name installguide.pdf in the doc subdirectory.

7. Click **Installation wizard** to start the installation program.
8. The **Welcome** window text suggests which documentation to review prior to installation. Click **Next** to continue or **Cancel** to exit.



9. Read the license agreement. Click either **I accept the terms of the license agreement** and click **Next** to proceed, or click **I do not accept the terms of the license agreement** and click **Cancel** to cancel the installation.

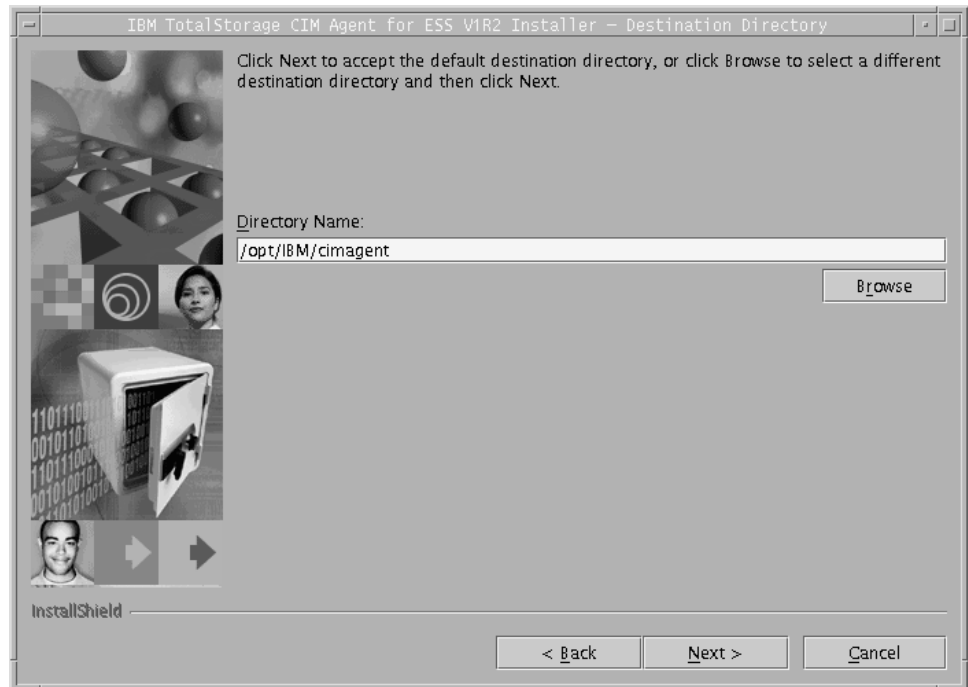


10. The **Product Installation Check** window opens and the wizard verifies that your machine meets the installation requirements.
 - If you have a service location protocol (SLP) daemon that is different from the SLP that the CIM Agent requires, the wizard displays an error and asks you to stop the installation and remove this SLP daemon from the system.

- The wizard checks if the ESS CLI client is installed on your machine.
- The wizard checks if a version of the CIM Agent is already installed. If the CIM Agent is installed, it checks if the SLP daemon and the IBM CIM Object Manager (CIMOM) daemon is started. If these daemons are started and you want to continue the installation program, select the **Next** button. Or, if you want to exit the installation program, select the **Cancel** button. If you choose to continue with the installation, you must stop all of the processes and dependent applications that use these daemons. You can save the old configuration settings (for example, user names, passwords, and device IP addresses) by selecting the check box that you see on the window.



11. The Destination Directory window opens. Click **Next** to accept the default directory, or click **Browse** to select a different directory for installation and then click **Next**.



Notes:

- a. The Destination Directory window is displayed only if the CIM Agent is not already installed. Otherwise, the CIM Agent will be reinstalled or upgraded to the same install location.
- b. If the wizard detects insufficient space for the CIM Agent in the file system containing the chosen directory, you can perform one of the following steps:
 - 1) Free some space in that directory and then click **Next**, or
 - 2) Click **Cancel** to exit the wizard, free some space in that filesystem, and then restart the wizard, or
 - 3) Click **Back** and choose another filesystem for the product.
12. The Updating CIMOM Port window opens. Click **Next** to accept the default port. If the default port is the same as another port already in use, modify the default port and click **Next**. Use the following command to check which ports are in use:

```
netstat -a
```

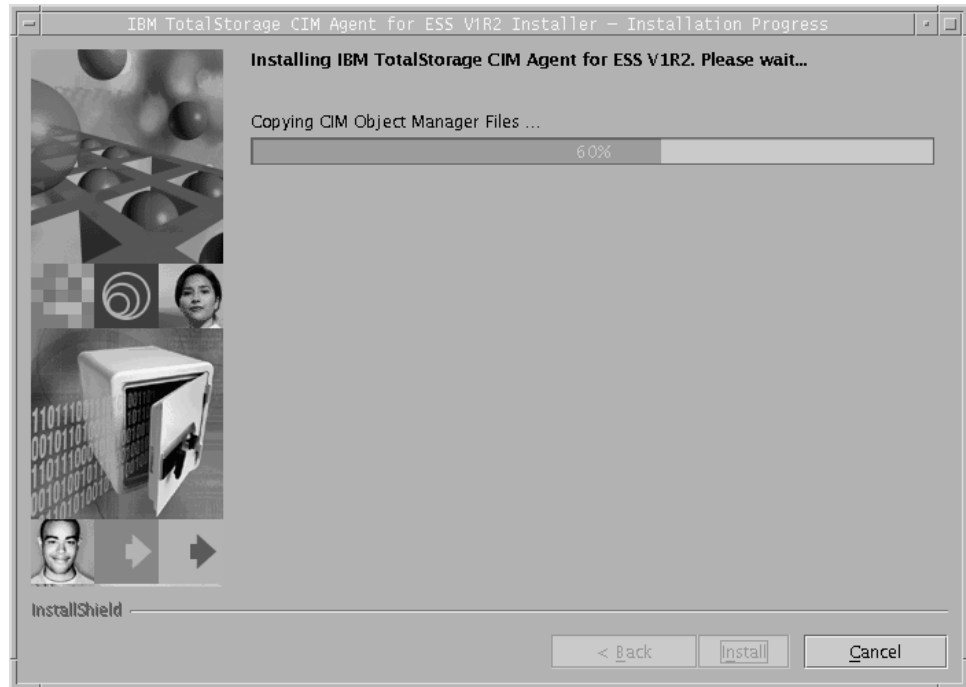
Or, click **Cancel** to exit the wizard.



13. The Installation Confirmation window opens. Click **Install** to confirm the installation directory and file size. Or, click **Cancel** to exit the wizard.



14. The Installation Progress window opens indicating how much of the installation has been completed. Installation usually takes 3 - 10 minutes depending on your machine configuration. If you do not want to continue with the installation, click **Cancel** to exit.



15. The Finish window opens and notifies you whether the installation was successful. Check the **View post installation tasks** check box if you want to continue with post installation tasks when the wizard closes. Click **Finish** to exit the wizard. You can view the installation log under *<des-path>/logs/install.log*, where *<des-path>* is your destination directory.



16. Exit the LaunchPad program by clicking **Exit** on the LaunchPad window. If you have not done so already, continue with the post installation tasks for the ESS

CIM Agent in the following sections. “Verifying the CIM Agent installation on AIX” on page 21 is the next task. You can also continue the post installation tasks using the following option:

- a. Click **Post installation tasks** on the LaunchPad window.
- b. Continue with the post installation tasks for the ESS CIM Agent by following the instructions in this file.

Related topics:

- “Verifying the CIM Agent installation on AIX” on page 21
- “Installing the CIM Agent on AIX in unattended (silent) mode”
- “Removing the CIM Agent on AIX” on page 27

Installing the CIM Agent on AIX in unattended (silent) mode

This section includes the steps to install the CIM Agent in your AIX environment using the unattended (silent) mode. You must comply with all prerequisites listed in “ESS CIM Agent installation requirements” on page 4 before you start the installation.

You can choose to install the CIM Agent in unattended (silent) mode, which involves customizing a response file and issuing a command or in graphical mode with the help of an installation wizard. If you want to install the CIM Agent in graphical mode, see “Installing the CIM Agent on AIX in graphical mode” on page 10, otherwise continue with this section. After the completion of either kind of installation, you will then verify the installation of the CIM Agent in section, “Verifying the CIM Agent installation on AIX” on page 21.

Context:

The unattended (silent) installation capability enables you to run an installation process unattended. You can create a standard response file to ensure that the product is installed consistently on multiple systems. The responsefile file is a template located on the CIM Agent CD that you must copy to disk and modify. To use the silent mode installation method, you will be performing the following tasks:

1. Find the responsefile file template on the CIM Agent installation compact disk.
2. Copy the responsefile template to your hard disk drive.
3. Customize the responsefile file to your specifications.
4. Save the updated responsefile file.
5. Invoke the response file using the setupaix script.

Steps:

Perform the following steps to install the CIM Agent in your AIX environment using the unattended (silent) mode:

1. Log on as a user with root authority.
2. Locate the responsefile file on your *CIM Agent for ESS* CD.
3. Retrieve and copy the responsefile file to your hard disk drive by typing the following commands:

```
# mkdir /tmp/cimagent
# cp -p /cdrom/AIX/responsefile /tmp/cimagent
```

where */tmp/cimagent* is your desired directory.

You must also modify the responsefile with your desired CIM Agent destination directory (*<dest-path>*).

4. To change the permissions on the responsefile so you can edit and save it to disk, type the following command:

```
chmod 777 /xxx/responsefile
```

where *xxx* is your desired directory.

5. Customize the responsefile file with your parameters as follows:

Using a text editor, modify the default options in the responsefile file with your desired values in a text editor such as *vi*:

- If you do not want to use the default value, remove the # character from the beginning of the line. Change the default value to the value that you want for that option. You *must* enclose all values in double quotation marks (" ").
- The *<product.installLocation>* option is used to define the default directory where the product will be installed. To use another destination directory, remove the # character from the corresponding line and replace this default directory with the desired directory.
- The *<-G checkPrerequisite>* option enables checking the prerequisites. To disable checking the prerequisites, remove the # character from the corresponding line and change its option's value to "no".
- The *<-G startUpgrade>* option enables the installation of CIM Agent over a previous installation of CIM Agent having the same version (reinstall) or lower version (upgrade). To do this, remove the # character from the corresponding line and change its option's value to "yes".
- The *<-G stopProcessesResponse>* option tells the install program whether to automatically stop SLP and CIM Agent daemons when you are reinstalling or upgrading the product. By default this option is set to "no". If you do not change this default value, the reinstallation or upgrade ends when these daemons are running. To automatically stop the SLP and CIMOM, remove the # character from the corresponding line and change its value to "yes".
- The *<-G saveConfiguration>* option specifies whether you to save the configuration settings (for example, user names, passwords, and device IP addresses) when you are reinstalling or upgrading the product. If you do not want to save the configuration settings, remove the # character from the corresponding line and change the value of the option to "no".
- The *<-W cimObjectManagerPorts.port>* option specifies the ESS CIM Agent server port. If you want to change the default value during installation, remove the # character from the corresponding line and change the default port value (5989) with the desired port value.
- The *<-W cimObjectManagerPorts.serverCommunication>* option specifies the ESS CIM Agent server communication protocol. If you want to change the default value during installation, remove the # character from the corresponding line and change the default server communication protocol (HTTPS) with HTTP protocol.

6. Save the modified responsefile file in your desired directory.
7. Type the following command to run the install file:

```
# ./setupaix -options <responsefile-path>/responsefile
```

Note: *<responsefile-path>* is the path of the responsefile file.

8. Wait for the wizard to complete the installation.

9. Check for installation errors in the install.log file. This file can be found in the `<dest-path>/logs` directory. Your install.log file should look similar to the following install.log file:

```
(Oct 13, 2003 10:32:25 AM), This summary log is an overview of the sequence of the
installation of the IBM TotalStorage CIM Agent for ESS V1R2 1.2.0.1
(Oct 13, 2003 10:32:29 AM), Checking AIX operating system level.
(Oct 13, 2003 10:32:29 AM), AIX level required:5.1.0.0; AIX level detected:5.1.0.0.
(Oct 13, 2003 10:32:44 AM), IBM TotalStorage CIM Agent for ESS V1R2 installation
process started with the following install parameters:
Target Directory: /opt/IBM/cimagent
(Oct 13, 2003 10:32:50 AM), Copying Service Location Protocol Files ...
(Oct 13, 2003 10:32:51 AM), Copying CIM Object Manager Files ...
(Oct 13, 2003 10:33:27 AM), IBM CIM Object Manager - ESS port successfully updated.
(Oct 13, 2003 10:33:27 AM), IBM CIM Object Manager - ESS communication protocol
successfully updated.
(Oct 13, 2003 10:33:27 AM), The file setupCmdLine successfully updated.
(Oct 13, 2003 10:33:27 AM), Compile MOF files started ...
(Oct 13, 2003 10:35:27 AM), MOF files successfully compiled.
(Oct 13, 2003 10:35:27 AM), Generate a certificate store started ...
(Oct 13, 2003 10:35:50 AM), Certificate store called truststore successfully generated.
(Oct 13, 2003 10:35:50 AM), Updating the Software Vital Product Data.
This action will take several minutes. Please wait...
(Oct 13, 2003 10:36:50 AM), The following services started successfully:
Service Location Protocol
IBM CIM Object Manager - ESS
(Oct 13, 2003 10:36:50 AM), INSTSUCC: The IBM TotalStorage CIM Agent for ESS V1R2 has
been successfully installed.
```

Note: If the installation fails before the target `<dest-path>` directory is created, you can find the temporary log in `/tmp/cimagent/install.log`.

10. Close the command prompt window by entering a command, for example **exit**. Continue with the post installation tasks for the ESS CIM Agent in the following sections. “Verifying the CIM Agent installation on AIX” is the next task. You can also continue the post installation tasks using the following option:
- Open the LaunchPad from the AIX directory of the CIM Agent for ESS CD by typing `# ./launchpad_aix`.
 - Click **Post installation tasks** on the LaunchPad window. Continue with the post installation tasks for the ESS CIM Agent by following the instructions in this file.

Related topics:

- “Verifying the CIM Agent installation on AIX”
- “Installing the CIM Agent on AIX in graphical mode” on page 10
- “Configuring the CIM Agent on AIX” on page 22
- “Removing the CIM Agent on AIX” on page 27

Verifying the CIM Agent installation on AIX

This section includes the steps necessary to verify that your CIM Agent is installed correctly on your AIX operating system.

Steps:

Perform the following steps to verify your CIM Agent installation:

- Verify the installation of the service location protocol (SLP).
 - Open a Command Prompt window and type the following command to verify that SLP is started:
`# ps -ef | grep slpd`

If the SLP daemon is started, the following output is displayed:

```
root 26438 26986 0 12:36:44 pts/3 0:00 grep slpd
daemon 20730 1 0 12:51:47 - 0:00 /opt/IBM/cimagent/slp/slpd
```

2. Verify the installation of the CIM Agent.

- a. Check that the CIMOM daemon is installed and started by typing the following command:

```
# ps -ef | grep CIMOM
```

The following is a sample output:

```
root 32518 1 0 15:52:05 - 0:08 /opt/IBM/cimagent/ibmjava131
/jre/bin/java -Xms128m -Xmx256m -cp /opt/IBM/cimagent/lib/xml4j-4_0_5/xercesImpl.
jar:/opt/IBM/cimagent/lib/xml4j-4_0_5/xmlParserAPIs.jar:/opt/IBM/cimagent/
ibmjava131/jre/lib/ext/ibmjsse.jar:/opt/IBM/cimagent/lib/JCE/IBMJCEfw.jar:/opt/IBM/
cimagent/lib/JCE/IBMJCEProvider.jar:/opt/IBM/cimagent/lib/JCE/local_policy.jar:/opt
/IBM/cimagent/lib/JCE/US_export_policy.jar:/opt/IBM/cimagent/lib/JCE/ibmpkcs.jar:
/opt/IBM/cimagent/ibmjava131/jre/lib/rt.jar:/opt/IBM/cimagent/ibmca.jar
com.ibm.cimom.CIMOM
root 28838 23968 0 15:57:21 pts/0 0:00 grep cimom
```

3. Start the CIMOM, if it is not started, by typing the following command:

```
# <dest-path>/startcimom
```

where *<dest-path>* is the destination directory where the CIM Agent is installed.

4. When you are finished with the CIM Agent CD, you can release the CD with the **umount** command, for example,

Note: If you are currently residing in /cdrom/AIX, you must exit out of the /cdrom directory by typing *cd /*. You will not be able to unmount the CD if you are residing in /cdrom/AIX.

```
# umount /dev/cd0
# umount /cdrom
```

Result:

If you are able to perform all of the verification tasks successfully, then the CIM Agent has been successfully installed on your AIX operating system.

Related topics:

- “Configuring the CIM Agent on AIX”

Configuring the CIM Agent on AIX

This section includes the steps to configure the CIM Agent after it has been successfully installed.

Context:

This task is performed after successful installation of the CIM Agent. This installation program performs the following tasks:

- Copies the directories and files from the ESS CIM Agent CD-ROM into the chosen destination directory
- Updates some script files using the selected destination

- Compiles the MOF files, creates the persistent subdirectory in the destination directory
- Generates a certificate called **truststore** in the destination directory, only for the server

Note: For a client installation, you must copy this certificate from the server and install it in the destination directory on the client machine if you intend to run in secure mode.

Steps:

Perform the following steps to configure the CIM Agent:

Note: In addition to the configuration steps below, you can use the **modifyconfig** command to change the configuration of some of the parameters that were configured during installation. You can change the CIM Agent port value, protocol (HTTP/HTTPS), and enable or disable the debug option. See “modifyconfig” on page 119 for a description of the **modifyconfig** command syntax.

1. Configure the CIM Agent for each ESS that the CIM Agent can access.

- a. Type the following command:

```
# <dest-path>/setdevice
```

where *<dest-path>* is the destination directory where the CIM Agent is installed.

The following is a sample output:

```
Application setdevice started in interactive mode
To terminate the application enter: exit
To get a help message enter: help
>>>
```

- b. Obtain an IP address, user name, and password for each ESS that the CIM Agent will manage.
- c. Type the following command for each ESS:

```
>>>address <9.111.111.111> <essuser> <esspass>
```

where

- *9.111.111.111* represents the IP address of the Enterprise Storage Server
- *essuser* represents the Enterprise Storage Server Specialist user name
- *esspass* represents the Enterprise Storage Server Specialist password for the user name

The following is a sample output:

```
An ess provider entry for IP 9.111.111.111 successfully added
```

where *9.111.111.111* is the IP address.

- d. Type the following command for each ESS server that is configured for Copy Services:

```
>>> addressserver <9.111.111.111> <essuser> <esspass>
```

where

- *9.111.111.111* represents the IP address of the Enterprise Storage Server
- *essuser* represents the Enterprise Storage Server Specialist user name
- *esspass* represents the Enterprise Storage Server Specialist password for the user name

The following is a sample output:

```
An essserver entry for IP 9.111.111.111 successfully added
```

where *9.111.111.111* is the IP address.

- e. Type the **exit** command to exit the CIMOM configuration program. A file named *provider-cfg.xml* is created in the destination directory.
2. Once you have defined all of the ESS servers, you must stop and start the CIMOM to make the CIMOM initialize the settings for the ESS servers. Because the CIMOM collects and caches the information from the defined ESSs at startup time, the CIMOM might take longer to start the next time you start it.
3. Configure the CIMOM for each user that you want to have authority to use the CIMOM by running the CIMOM configuration program.

During the ESS CIM Agent installation, the default user name to access the ESS CIM Agent CIMOM is created. The default user name is “superuser” with a default password of “passw0rd”. You must use the default user name and password when using the **setuser** command for the first time after installation. Once you have added other users, you can initiate the **setuser** command using a user name that you defined instead of the default.

- a. Start the CIMOM, if it is not started, by typing the following command:

```
# <dest-path>/startcimom
```

where *<dest-path>* is the destination directory where the CIM Agent is installed.

- b. Type the following command:

```
# <dest-path>/setuser -u superuser -p passw0rd
```

where *<dest-path>* is the destination path where the CIM Agent is installed.

The following is a sample output:

```
Application setuser started in interactive mode
To terminate the application enter: exit
To get a help message enter: help
>>>
```

Restriction: You cannot delete or modify the current user logged in using the **setuser** command.

- c. Obtain a user name and password for each user that can manage the CIMOM. Type the following command for each user:
- ```
>>>adduser <cimuser> <cimpass>
```

where

- *cimuser* represents the new user name to access the ESS CIM Agent CIMOM

- *cimpass* represents the password for the new user name to access the ESS CIM Agent CIMOM

The following is a sample output:

An entry for user cimuser successfully added

where *cimuser* is your new user name.

- d. When you have completed adding new users to access the ESS CIM Agent CIMOM, issue the **exit** command.
- e. You can change the default password for "superuser" by starting the **setuser** command for a user that you added in step c above. Then issue the following command to change the password:

```
>>>chuser superuser <newpasswd>
```

where *newpasswd* is the new password for the superuser.

Or, delete the superuser by issuing the following command:

```
>>>deluser superuser
```

- f. Type the **exit** command to exit the CIMOM configuration program.

#### Result:

If you are able to perform all of the configuring tasks successfully, the CIM Agent has been successfully installed on your AIX operating system.

#### Related topics:

- "Verifying connection to the ESS" on page 26

## Configuring the CIM Agent to run in unsecure mode

Some vendor software might not be capable of communicating with the CIM Agent in a secure fashion. If you wish to, you can still use this vendor software by configuring the CIM Agent to run with only basic user and password security.

#### Steps:

Perform the following steps to configure in unsecure mode:

1. Type the **stopcimom** command in the destination directory to stop the CIMOM.
2. Find the cimom.properties file in the target directory and edit it with a tool such as vi editor. The following is an example:

```
ServerCommunication=HTTP
Port=5988
DigestAuthentication=False
```

3. Type the **startcimom** command to restart the CIMOM.
4. Verify that the server started on Port 5988 by opening the cimom.log file.

---

## Verifying connection to the ESS

This section includes the steps you need to perform to verify connection to the ESS.

### Prerequisites:

Before using the CIM Agent, verify that the ESS CLI software has network connectivity to the ESS by issuing the following command from a Command Prompt window:

```
esscli -u <essuser> -p <esspass> -s <9.111.111.111> list server
```

where:

- *essuser* is an Enterprise Storage Server Specialist user name.
- *esspass* is the Enterprise Storage Server Specialist password for that user name.
- *9.111.111.111* is the IP address of the Enterprise Storage Server.

**Note:** The ESS CLI does not set the PATH variable. Update the PATH environment variable using the path where the CLI for ESS 2105 is installed. See “Installing the ESS CLI on AIX” on page 7 for more information.

A response similar to the following is displayed:

```
Thu Oct 09 13:20:40 PDT 2003 IBM ESSCLI 2.3.0.1
```

| Server     | Model | Mfg | WWN              | CodeEC    | Cache | NVS | Racks |
|------------|-------|-----|------------------|-----------|-------|-----|-------|
| 2105.22232 | 800   | 013 | 5005076300C09470 | 2.3.0.357 | 8GB   | 2GB | 1     |

### Steps:

Perform the following to start and verify the service location protocol (SLP) daemon and the CIMOM.

1. Type the following command to see if the SLP daemon is started:

```
ps -ef | grep slpd
```

If the SLP daemon is not started, continue with the next step. If the SLP daemon is started, go to step 3.

2. Start the SLP daemon, if it is not started, by typing the following command from a separate window.

```
/etc/rc.slpd
```

This session will remain active until you stop it. You should keep it running as long as the CIM Agent is running.

3. Type the following command to see if the CIMOM is started:

```
ps -ef | grep CIMOM
```

If the CIMOM is not started, go to step 4. If the CIMOM is started, go to step 5 on page 27.

4. Start the CIMOM by running the startcimom script:

```
<dest-path>/startcimom
```

Where *<dest-path>* is the destination directory where the CIM Agent is installed. The default is to start the secure CIMOM. It will register itself with SLP and accept requests on Port 5989.

5. Type the following command to locate all WBEM services (for example, CIMOMs) in the local network.

Type the following command from a Command Prompt window:

```
<dest-path>/verifyconfig -u <user> -p <password>
```

where *<user>* and *<password>* are the user ID and passwords for a CIMOM user that was created using **setuser** command.

A message similar to the following is displayed:

```
./verifyconfig -u xxxx -p nnnn
Verifying configuration of ESS CIM Agent...
Communicating with SLP to find WBEM services...
3 WBEM services found
 host=baboon, port=5988
 host=gorilla, port=5988
 host=tpc03, port=5988
Connecting to ESS CIM Agent, host=baboon, port=5988
Found 1 IBMTSESS_StorageSystem instances
Verification Successful
```

where *xxxx* is your user ID and *nnnn* is your password.

#### Result:

The CIM Agent is now running.

---

## Removing the CIM Agent on AIX

This optional task includes the steps necessary to remove the CIM Agent from your AIX operating system.

#### Steps:

Perform the following steps to remove the CIM Agent:

1. Log on as a user with root authority.
2. Stop all the processes and applications that use SLP and CIMOM, that are running on your system before you remove the CIM Agent for ESS.
3. Type the following command to stop the IBM CIM Object Manager (CIMOM) daemon.

```
<dest-path>/stopcimom
```

where *<dest-path>* is the destination directory where the product was installed.

4. Type the following command to see if SLP daemon is running:

```
ps -ef | grep slpd
```

If SLP is running, the following output is displayed:

```
daemon 24452 1 0 Nov 13 - 0:00 /opt/IBM/cimagent/slp/slpd
root 37756 27328 0 14:55:47 pts/1 0:00 grep slpd
```

5. Type the following command to stop the service location protocol (SLP):

```
kill 24452
```

6. Run the removal program in graphical mode (see “Removing in graphical mode”) or in unattended (silent) mode (see “Removing in unattended (silent) mode” on page 31) to remove the CIM Agent and Service Location Protocol.

## Removing in graphical mode

Perform the following steps to remove the CIM Agent using graphical mode:

1. Type the following command to run the removal program from the \_uninst subdirectory of the *<dest-path>*:

```
<dest-path>/_uninst/uninstaller
```

where *<dest-path>* is the destination directory where the CIM Agent is installed.

2. If the removal program was not created during the CIM Agent installation, type the following command:

```
<dest-path>/ibmjava131/jre/bin/java -jar <dest-path>/_uninst/uninstall.jar
```

where *<dest-path>* is the destination directory where the CIM Agent is installed.

3. The Welcome window opens. Click **Next** to continue with the removal program, or click **Cancel** to exit the removal program.

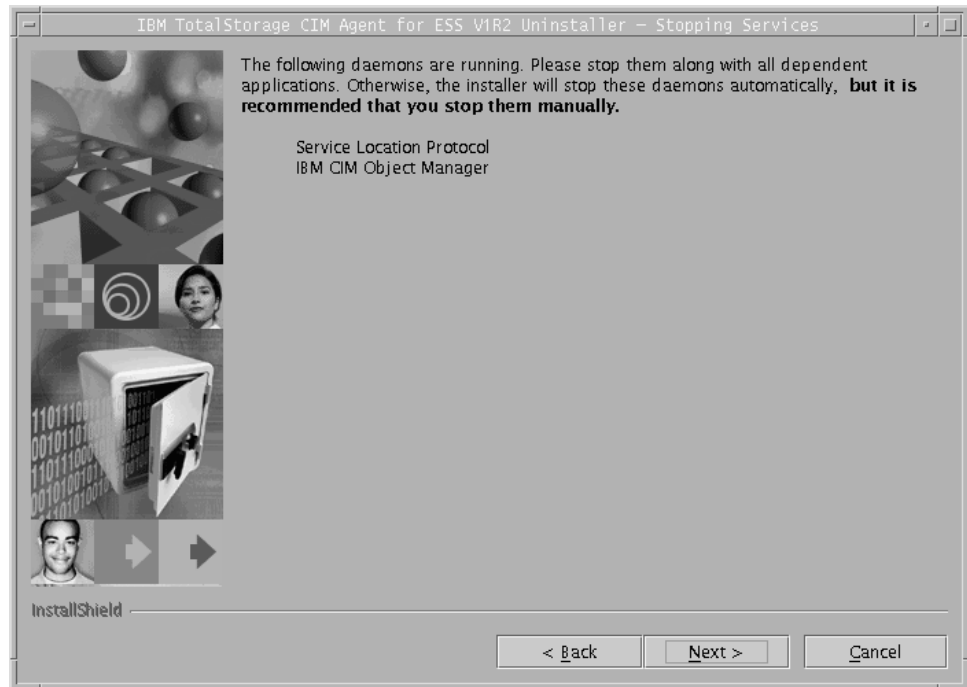


The program detects if the service location protocol (SLP) and the IBM CIM Object Manager (CIMOM) services are running and displays the following information:

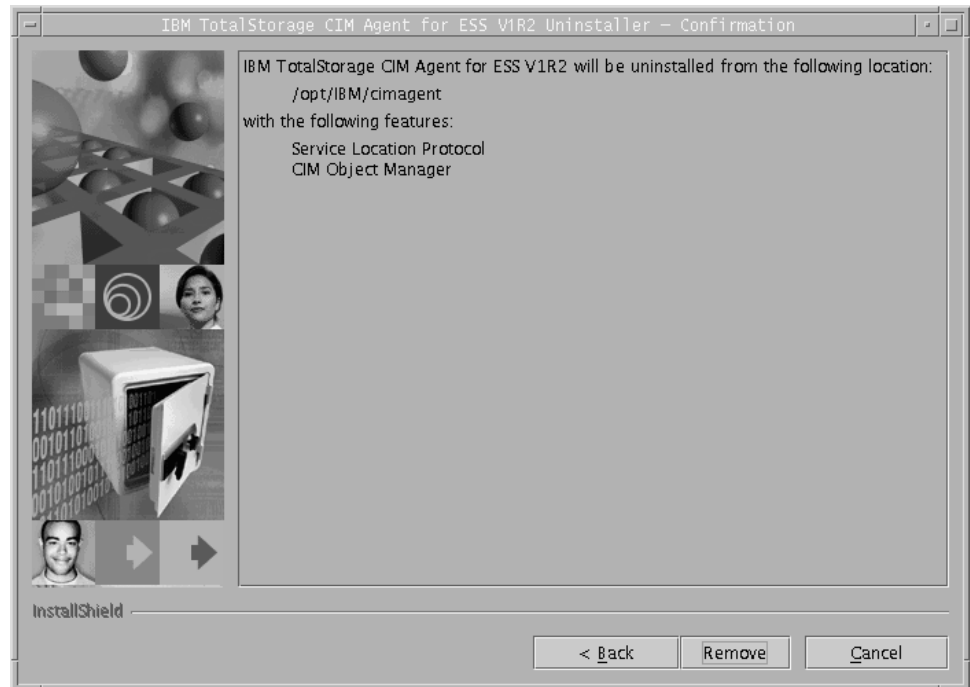


- If the SLP and the CIMOM are running, the Stopping Services window asks if you want to continue with the removal program. In that case, click **Next** to stop the services. Click **Cancel** to stop the services manually, which is recommended.
- If you want to manually stop the services, you must exit the removal program, stop the services and the applications that use them, and then run the removal program again from the beginning.

**Attention:** You must be careful if you have other applications that use the SLP service. If you do, you must stop these applications before you stop the SLP service because the SLP service is deleted during the removal process.



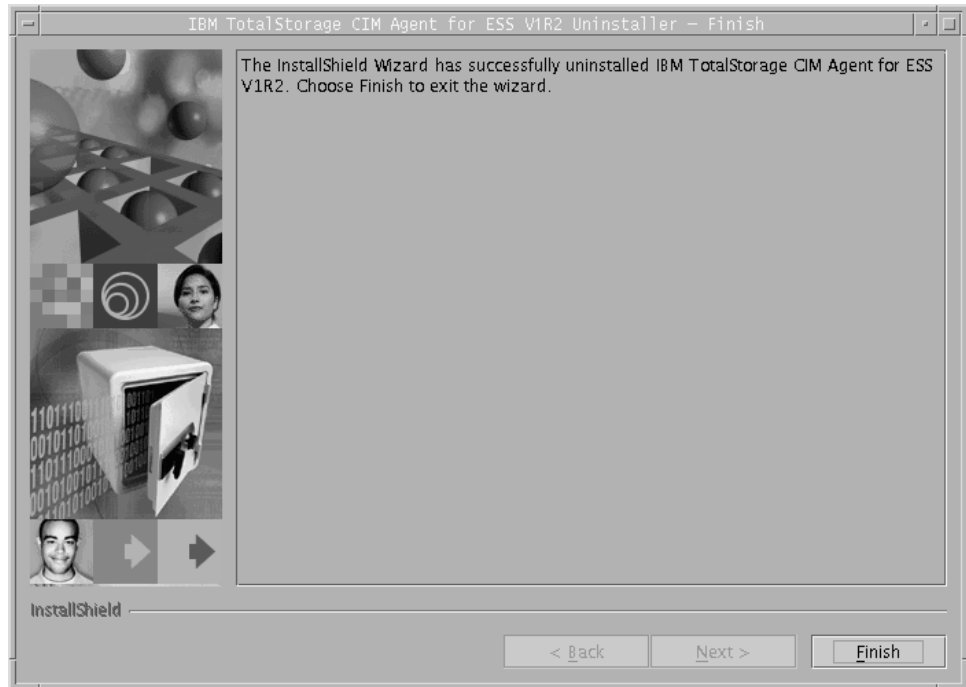
- If neither the SLP service nor the CIMOM service is running, the removal program continues with the Preview window.
4. The Confirmation window opens, displaying the location of the product that will be removed. Click **Remove** to continue with the removal program, or click **Cancel** to exit.



5. The Uninstallation Progress window opens. Wait for the program to remove the CIM Agent. If you do not want to continue with the removal, click **Cancel** to return to the Confirmation window.



6. The Finish window opens displaying information about the result of removal (successfully or failed).



Click **Finish** to end the removal program.

## Removing in unattended (silent) mode

### Steps:

Perform the following steps to remove the CIM Agent in unattended (silent) mode:

1. Stop SLP, CIMOM, and all related processes.
2. Type the following command to run the removal program from the `_uninst` subdirectory:

```
<dest-path>/_uninst/uninstaller -silent
```

where `<dest-path>` is the destination directory where the CIM Agent is installed.

If the program detects that the service location protocol (SLP) or the IBM CIM Object Manager (CIMOM) services are running, it displays an error message and the uninstallation fails. You can look for details in the `/tmp/cimagent/uninstall.log` file. However, if you want the program to automatically stop the services, you must set the `stopProcessesResponse` option to `yes` in the command line:

```
<dest-path>/_uninst/uninstaller -silent -G stopProcessesResponse=yes
```

### Post-processing requirements:

The CIM Agent removal process does not remove configuration files, logs, and similar files that are created during or after the installation process. They are located in the destination path where CIM Agent was installed. For example, the default destination path is `/opt/IBM/cimagent`.

Remove the directory and all of its contents (especially if you plan to reinstall the CIM Agent).

**Note:** If you want to keep the old configuration files, save them in another location on your system before removing them from the installation destination path, so you can restore them later.

To remove the directory, cimagent, you must type the following command, for example, from the IBM directory.

```
rm -r /opt/IBM/cimagent
```

**Note:** The recursive remove is used in the following example because the CIM Agent has a deep directory structure. The recursive remove is very powerful and dangerous. You should use the fully qualified directory name.

---

## Chapter 3. CIM Agent for Linux

This chapter includes an overview of the installation process and instructions for installing and configuring the CIM Agent on a Linux (Red Hat 7.2) operating system.

---

### Installation overview for Linux

This section provides an overview and instructions for installing and configuring the CIM Agent on the Linux (Red Hat 7.2) operating system. You should have some knowledge of how to administer Linux operating system before you begin to install the CIM Agent. You should also become familiar with the command explanations that you use to install and configure the CIM Agent. See Chapter 5, “CIM Agent installation and configuration commands,” on page 85 for information about the commands.

The following list of installation and configuration tasks are discussed in the order in which they should be performed:

1. Before you install the CIM Agent on a Linux operating system, check the hardware and software requirements listed in “ESS CIM Agent installation requirements” on page 4.
2. Install the prerequisite ESS CLI 2105 for Linux software as instructed in “Installing the ESS CLI on Linux.”  
**Attention:** If you are upgrading from a previous version of the ESS CIM Agent, you must uninstall the ESS CLI software that the previous CIM Agent required and reinstall the latest ESS CLI software, which is level 2.3.0.13.
3. You can choose to install the CIM Agent either in graphical mode with the help of a wizard or in unattended mode (also known as silent mode), which involves customizing a response file and issuing a command.
  - a. If you want to install the CIM Agent in graphical mode, perform the instructions in “Installing the CIM Agent on Linux in graphical mode” on page 35.
  - b. If you want to install the CIM Agent in unattended mode, perform the instructions in “Installing the CIM Agent on Linux in unattended (silent) mode” on page 43.
4. Configure the CIM Agent by performing the instructions in “Configuring the CIM Agent on Linux” on page 48. You might want to revisit this section in the future as you add, change, or delete CIMOM authentication and ESS information.
5. Enable the CIM Agent by performing the instructions in “Verifying connection to the ESS” on page 51.
6. For instructions about removing the CIM Agent, see “Removing the CIM Agent on Linux” on page 52. You only need to perform this optional task if you get errors during installation verification or if the CIM Agent did not set the environment variables.

---

### Installing the ESS CLI on Linux

Before you install the CIM Agent, you must install the ESS CLI. The ESS CLI must be installed first because the CIM Agent sets the path information in shell scripts for you based on the location of the ESS CLI. The CIM Agent installation wizard checks your system for the existence of the ESS CLI, and the wizard stops if the ESS CLI is not installed.

## Steps:

Perform the following steps to install the ESS CLI on Linux (Red Hat 7.2):

1. Select the *ESS CLI* CD.

This ESS CLI CD contains the ESS CLI installation packages and the *IBM TotalStorage Enterprise Storage Server Command-Line Interfaces User's Guide*.

2. Select the `IBMesscli-2.3.0.13-0.i386.rpm` package.

**Note:** The CIM Agent supports ESS CLI level 2.3.0.13.

3. Follow the installation instructions from the *IBM TotalStorage Enterprise Storage Server Command-Line Interfaces User's Guide*, which can be found on the IBM TotalStorage Enterprise Storage Server Customer Documents CD to install the ESS CLI. You *must* download and install the required Java before you install the ESS CLI. In this guide, the “ESS CLI” is referred to as the “Storage Management CLI”.

If you have an earlier version of the ESS CLI installed, the **`rpm install`** command does not allow you to install the `IBMesscli-2.3.0.13-0.i386.rpm` package unless you uninstall the earlier version. If an earlier version of the ESS CLI is installed, a message similar to the following is displayed:

```
IBMesscli-V.R.M.F-X
```

where

- *V* represents the CLI version number
- *R* represents the release number
- *M* represents the number of times that the release package was built
- *F* represents the fix level
- *X* represents the number of times that the release package was built

Issue the following command to remove the earlier version of the ESS CLI:

```
rpm -e IBMesscli -V.R.M.F-X
```

where

- *V* represents the CLI version number
- *R* represents the release number
- *M* represents the number of times that the release package was built
- *F* represents the fix level
- *X* represents the number of times that the release package was built

4. Verify that the required version of the ESS CLI is installed.

Review the installed programs on your Red Hat Linux system. The level of the ESS CLI software must be 2.3.0.13 or later. To check the level, type the following command:

```
rpm -qa | grep IBMesscli
```

If the ESS CLI is installed, a message similar to the following is displayed:

```
IBMesscli-V2.3.0.13-0
```

5. Follow the instructions in “Verifying connection to the ESS” on page 51 to verify that the ESS CLI has connectivity to your ESS.
6. Verify if the ESS CLI is operational and all the environment variables have been set.

**Note:** Before you run the esscli, you must know where the ESS CLI is installed. You can find out where it is installed by typing the following command:

```
rpm -q IBMesscli-2.3.0.13-0 | grep esscli
```

where *2.3.0.13-0* is the level reported from the **rpm -qa** command in step 4.

To verify if the ESS CLI is operational, type the following command:

```
/opt/ibm2105cli/esscli
```

The following is a sample output:

```
[root@store03 ibm2105cli]# ./esscli
Thu Oct 09 11:27:32 PDT 2003 IBM ESSCLI 2.3.0.1

esscli -a AccessFile [-key KeyName] | -u Username -p Password
 -s ServerAddress [-b BackupServer]
 [-v|-nov] [-hdr|-nohdr] [-ssl|-nossl] [-debug|-nodebug]
 [-refresh|-norefresh] [-fmt "Format"]
 Cmdnd_Action Cmdnd_Category [-d "argument_pairs"]

List of Cmdnd_Actions, Cmdnd_Categories, and argument_pairs:
=====

DiskGroup Category:

 list DiskGroup [-d "ess=EssId"]

.....lines omitted from sample.....

WebUserAccount Category:

 list WebUserAccount [-d "ess=EssId"]
 [-fmt user,acclvl,iprange,comments]
 create WebUserAccount -d "ess=EssId user=UserId pwd=Password
 acclvl=AccessLevel iprange=IPRange comments='Comments'"
 set WebUserAccount -d "ess=EssId user=UserId
 (newuser=NewUserId|newpwd=NewPassword|
 newacclvl=NewAccessLevel|newiprange=NewIPRange|
 newcomments='NewComments')*"
 delete WebUserAccount -d "ess=EssId user=UserId"

[root@store03 ibm2105cli]#
```

---

## Installing the CIM Agent on Linux in graphical mode

This section includes the steps to install the CIM Agent in your Linux environment using the graphical mode. You must comply with all prerequisites listed in “ESS CIM Agent installation requirements” on page 4 before you start the installation.

You can choose to install the CIM Agent in graphical mode with the help of an installation wizard or in unattended (silent) mode, which involves customizing a response file and issuing a command. If you want to install the CIM Agent in unattended mode, see “Installing the CIM Agent on Linux in unattended (silent) mode” on page 43, otherwise continue with this section. After the completion of either kind of installation, you will then verify the installation of the CIM Agent in section, “Verifying the CIM Agent installation on Linux” on page 47. Before you install the CIM Agent on Linux, you should check the hardware and software requirements listed in “ESS CIM Agent installation requirements” on page 4.

## Steps:

You should have some knowledge about how to administer Linux before you begin installing the CIM Agent.

**Note:** The description of commands in this task have the convention of optional and substitution parameters between greater than ">" and less than "<" symbols. You should become familiar with the explanation before entering the command.

Perform the following steps to install the CIM Agent on your Linux system:

1. Log on as a user with root authority.
2. Insert the *CIM Agent for ESS* CD.
3. Create a mount point or choose an existing mount point.

Type the following command to create a mount point called /mnt/cdrom:

```
mkdir /mnt/cdrom
```

4. Type the following command to mount the CD-ROM file system at the desired mount point:

```
mount /mnt/cdrom
```

5. Change the current directory to the mount point for the CD drive, in the LINUX directory. For example, if the CD was mounted at the /mnt/cdrom mount point, type the following command:

```
cd /mnt/cdrom/LINUX
```

6. Check the README.linux file located in the LINUX directory on the *CIM Agent for ESS* CD. The README.linux file can provide additional information that supersedes information in this guide.

You can also find this installation guide on the *CIM Agent for ESS* CD under the file name installguide.pdf in the document subdirectory.

7. The CIM Agent installation in graphical mode begins with a LaunchPad facility to launch the installation program wizard. The LaunchPad facility provides links for you to view various text files, such as the product overview, product readme, post installation tasks, and various Adobe Acrobat files, such as, the Installation guide, product license agreement and a browser link to the IBM storage product technical support page.

The Installation guide and license agreement are in Adobe Acrobat file format (.pdf). In order for the LaunchPad to provide links to the Adobe Acrobat files, your system *must* have Adobe Acrobat Reader installed. In order for the browser to link to the IBM storage product technical support page, you *must* have a browser installed on your system where you start the LaunchPad facility.

If you wish to use the LaunchPad facility links to view the Adobe Acrobat files, you must have the Adobe Acrobat Reader bin location in your PATH environment variable. You can verify this by running the following command:

```
echo $PATH
```

Locate the Adobe Acrobat Reader bin location in the PATH, for example, /usr/opt/Acrobat5/bin. If the Adobe Acrobat Reader bin location is not in the environment path, you can set it by typing the following command:



```
export PATH=$PATH:/usr/opt/ Acrobat5/bin
```

where */usr/opt/ Acrobat5/bin* is the location of the Adobe Acrobat Reader bin directory.

8. Run the wizard launcher, `launchpad_linux`, from the Linux directory of the CD by typing the following command:

```
./launchpad_linux
```

This command starts the CIM Agent LaunchPad, a small graphical program that launches the wizard.

9. The LaunchPad window opens. Choose from the following options:

**CIM Agent overview**

Offers information about the CIM Agent.

**Readme file**

Offers any last minute product information that did not make it into this installation guide.

**Installation guide**

Offers instructions on how to install the CIM Agent.

**License Agreement**

Offers information about the license of the CIM Agent.

**CIM Agent Web site**

Offers information from the product Web site.

**Installation wizard**

Starts the CIM Agent installation program.

**Post installation tasks**

Offers information about configuring the users and device communications.

**Exit** Exits the Launchpad program.

The LaunchPad window remains open (behind the wizard) during the installation. You can access product information after the installation has started. The LaunchPad returns to the forefront when the installation is complete. You can click **Exit** to close the LaunchPad.

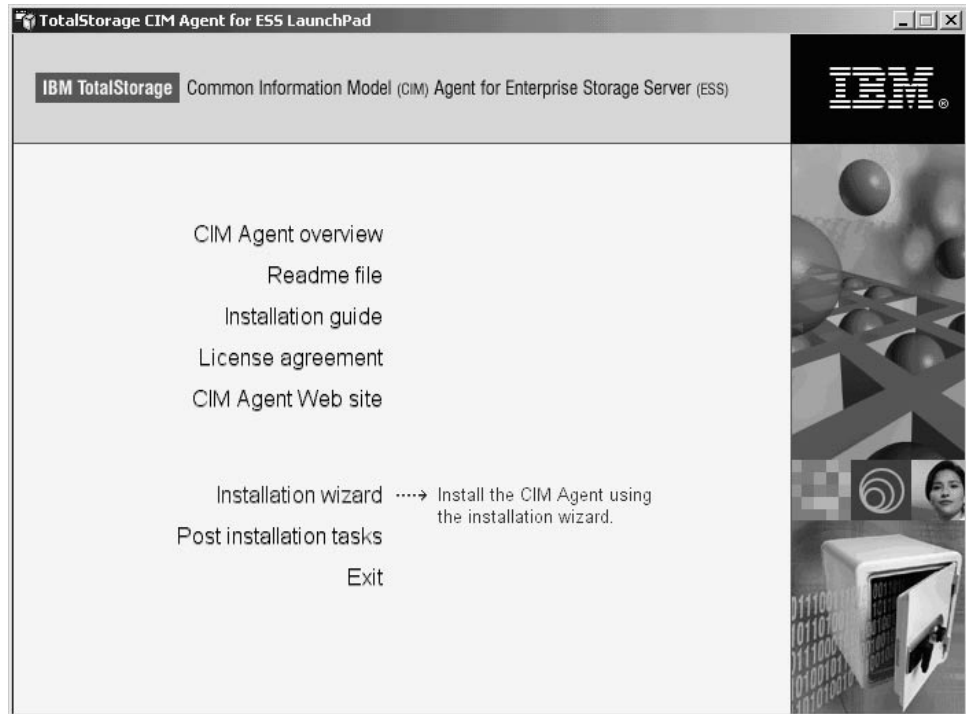
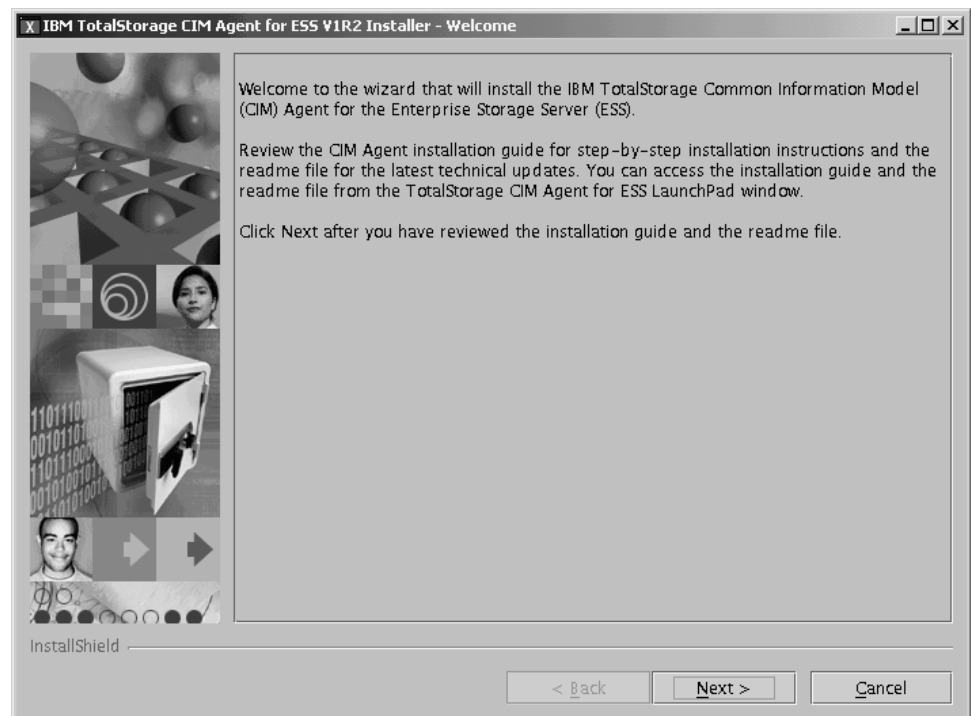
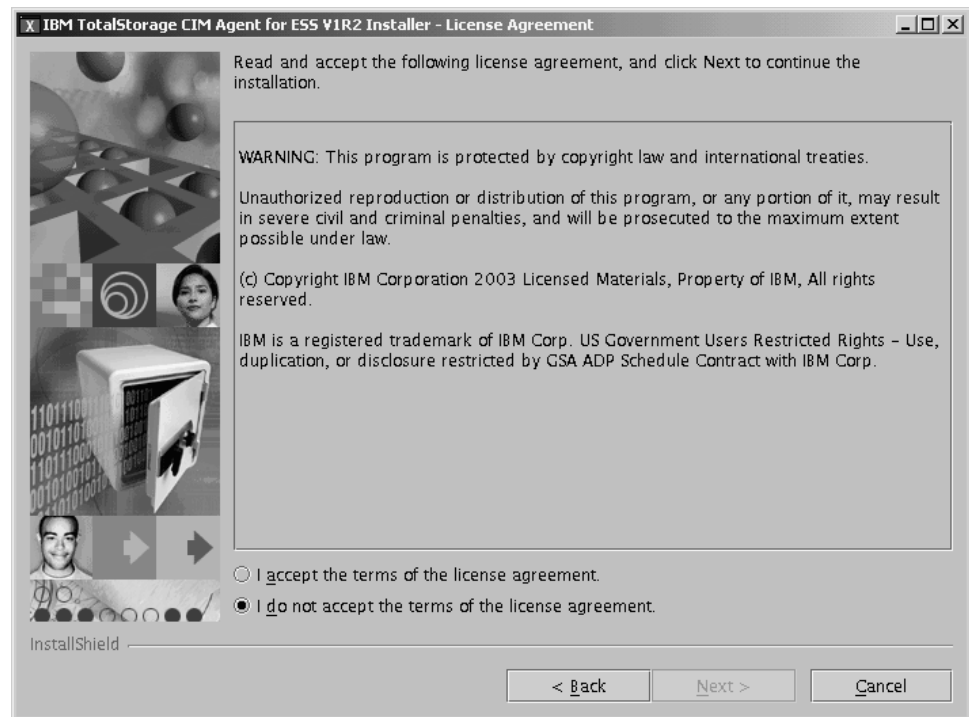


Figure 4. LaunchPad window

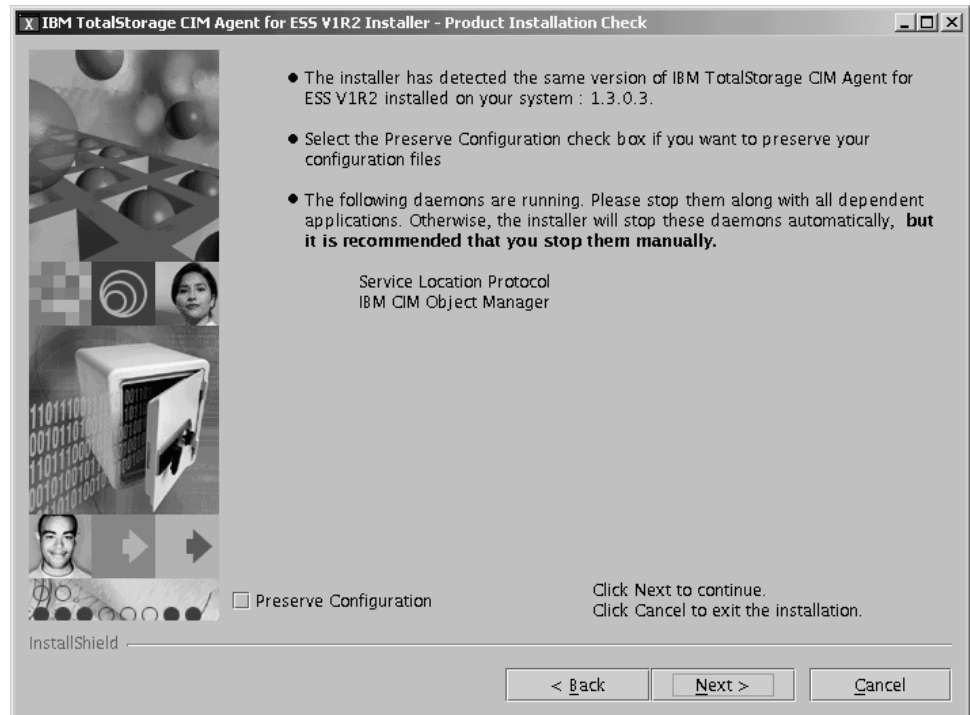
10. Click Installation wizard to begin the CIM Agent installation.
11. The Welcome window opens suggesting which documentation you should review prior to installation. Click **Next** to continue or click **Cancel** to exit.



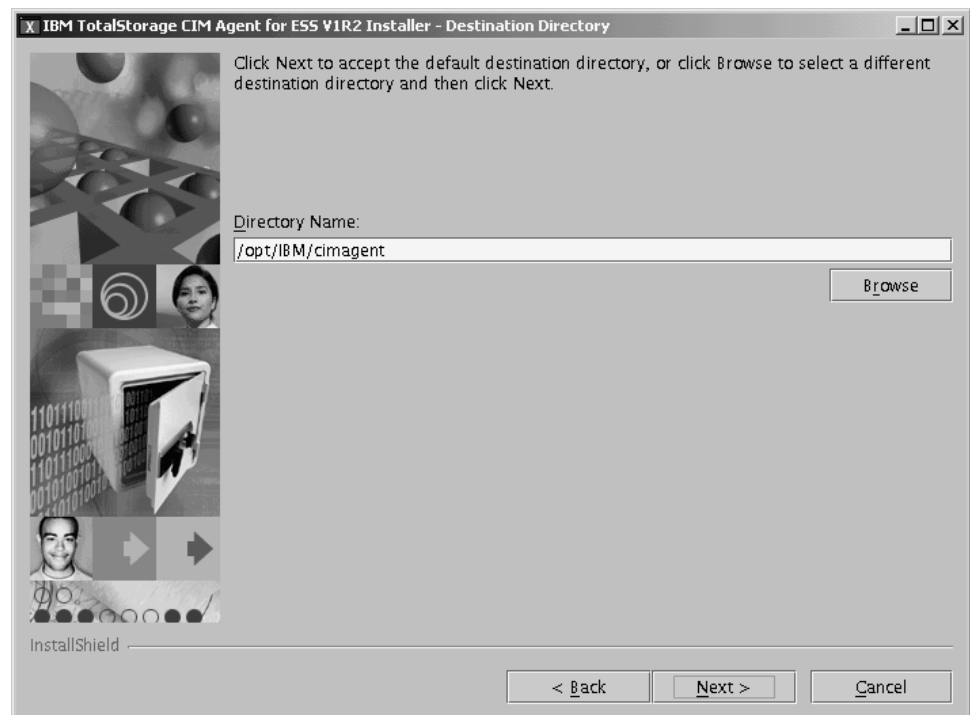
12. Read the license agreement information. Click **I accept the terms of the license agreement** and click **Next** to proceed, or click **I do not accept the terms of the license agreement** and click **Cancel** to exit the installation.



13. The Product Installation Check window opens and the wizard verifies that your machine meets the installation requirements.
- If you have a service location protocol (SLP) service that is different from the SLP that the CIM Agent requires, the wizard displays an error and asks you to stop the installation and remove this SLP service from the system.
  - The wizard checks whether the ESS CLI client is installed on your machine.
  - The wizard checks whether a version of the CIM Agent is already installed. If the CIM Agent is installed, it checks if the SLP service and the IBM CIM Object Manager (CIMOM) service is started. If these services are started and you want to continue the installation program, select the **Next** button. Or, if you want to exit the installation program, select the **Cancel** button. If you choose to continue, you must stop all of the daemons and dependent applications that use these services. You can save the old configuration (for example, user names, passwords, and device IP addresses) by selecting the check box that you see on the window.



14. The Destination Directory window opens. Click **Next** to accept the default directory, or click **Browse** to select a different directory for installation and then click **Next**.

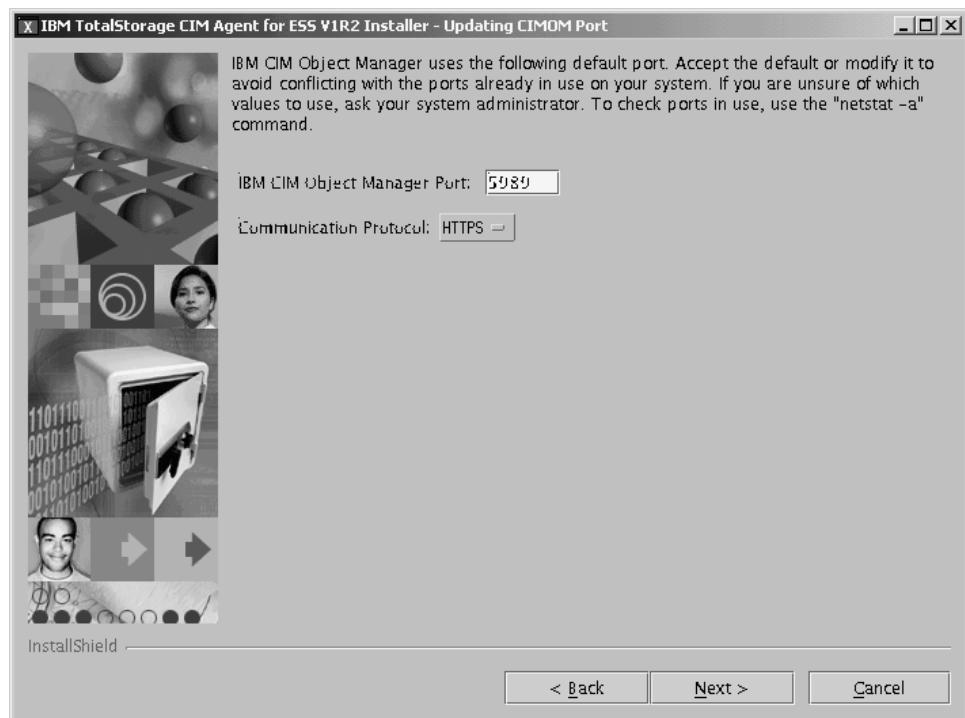


### Notes:

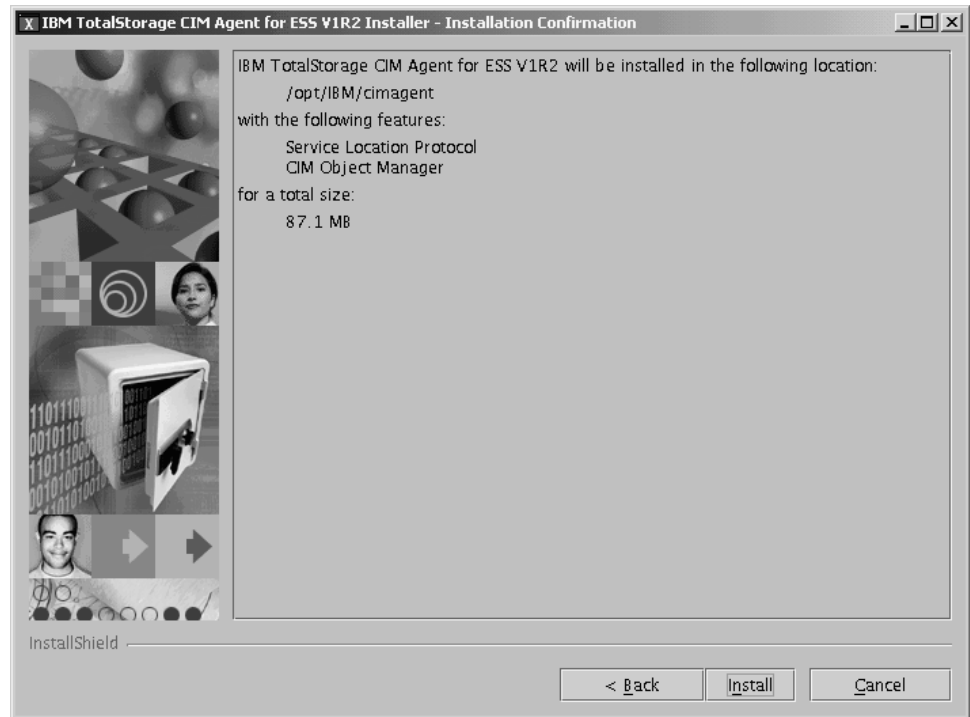
- a. The Destination Directory window is displayed only if a version of CIM Agent is not already installed. Otherwise, the CIM Agent will be reinstalled or upgraded to the same install location.
  - b. If the wizard detects insufficient space for the CIM Agent in the filesystem containing the chosen directory, you can perform one of the following steps:
    - 1) Free some space in that directory and then click **Next**.
    - 2) Click **Cancel** to exit the wizard, free some space in that filesystem, and then restart the wizard, or
    - 3) Click **Back** and choose another filesystem for the product.
15. The Updating CIMOM Port window opens. Click **Next** to accept the default port. If the default port is the same as another port already in use, modify the default port and click **Next**. Use the following command to check which ports are in use:

```
netstat -a
```

Or, click **Cancel** to exit the wizard.



16. The Installation Confirmation window opens. Click **Install** to confirm the installation directory and file size, or click **Cancel** to exit the wizard.

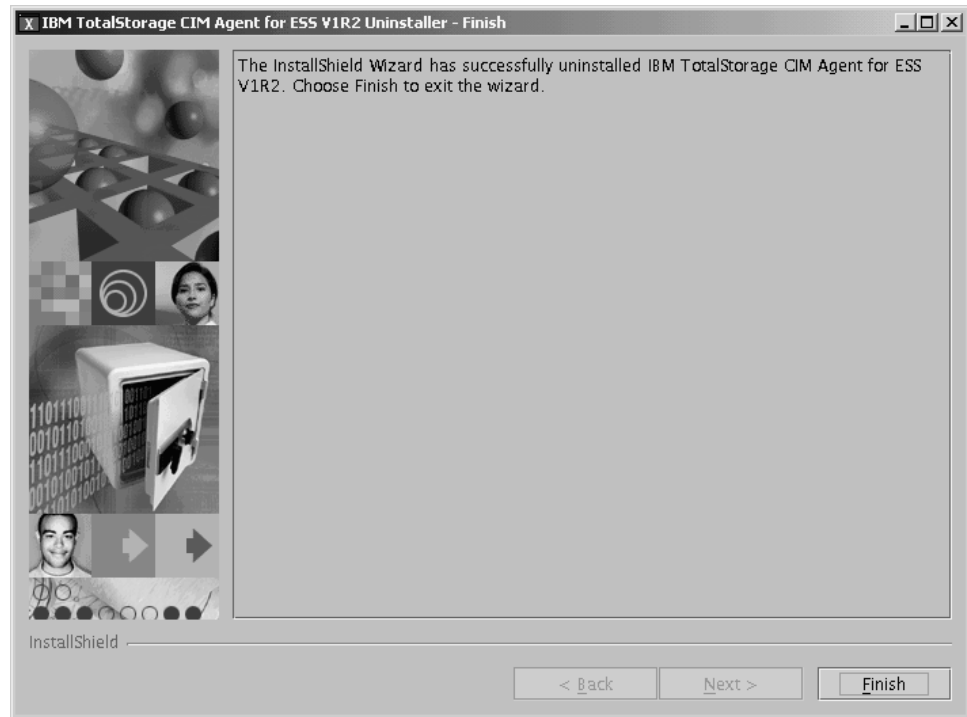


17. The Installation Progress window opens indicating how much of the installation has been completed. Installation usually takes 3 - 10 minutes depending on your machine configuration. If you do not want to continue with the installation, click **Cancel** to exit.



18. The Finish window opens and notifies you whether the installation was successful. Check the **View post installation tasks** check box if you want to continue with post installation tasks when the wizard closes. Click **Finish** to

exit the wizard. You can view the installation log under *<des-path>/logs/install.log*, where *<des-path>* is your destination directory.



19. Exit the LaunchPad program by clicking **Exit** on the LaunchPad window. If you have not done so already, continue with the post installation tasks for the ESS CIM Agent in the following sections. "Verifying the CIM Agent installation on Linux" on page 47 is the next task. You can also continue the post installation tasks using the following option:
  - a. Click **Post installation tasks** on the LaunchPad window.
  - b. Continue with the post installation tasks for the ESS CIM Agent by following the instructions in this file.
20. When you are finished with the *CIM Agent for ESS* CD, type the following command to remove the CD:

```
umount/mnt/cdrom
```

where */mnt/cdrom* is where the CD is mounted.

#### Related topics:

- "Installing the CIM Agent on Linux in unattended (silent) mode"
- "Verifying the CIM Agent installation on Linux" on page 47
- "Installing the CIM Agent on Linux in graphical mode" on page 35
- "Removing the CIM Agent on Linux" on page 52

---

## Installing the CIM Agent on Linux in unattended (silent) mode

This section includes the steps to install the CIM Agent in your Linux environment using the unattended (silent) mode. You must comply with all prerequisites that are listed in "ESS CIM Agent installation requirements" on page 4 before you start the installation.

You can choose to install the CIM Agent in unattended (silent) mode, which involves customizing a response file and issuing a command or in graphical mode with the help of an installation wizard. If you want to install the CIM Agent in graphical mode, see “Installing the CIM Agent on Linux in graphical mode” on page 35, otherwise continue with this section. After the completion of either kind of installation, you will then verify the installation of the CIM Agent in section, “Verifying the CIM Agent installation on Linux” on page 47.

### Context:

The unattended (silent) installation capability enables you to run an installation process unattended. You can create a standard response file to ensure that the product is installed consistently on multiple systems. The responsefile file is a template located on the CIM Agent CD that you must copy to disk and modify. To use the silent mode installation method, you will be performing the following tasks:

1. Find the responsefile file template on the CIM Agent installation compact disk.
2. Copy the responsefile template to your hard disk drive.
3. Customize the responsefile file to your specifications.
4. Save the updated responsefile file.
5. Invoke the response file using the setuplinux script.

### Steps:

Perform the following steps to install the CIM Agent in your Linux environment using the unattended (silent) mode:

1. Log on as a user with root authority.
2. Type the following commands to locate the responsefile file on your *CIM Agent for ESS* CD.

```
cd /mnt/cdrom
cd LINUX
```

3. Copy the responsefile file to your hard disk drive by typing the following command:

```
cp ./responsefile /root/xxxx
```

where *xxxx* is your desired directory.

4. Customize the responsefile file with your parameters as follows:

Using a text editor, modify the default options in the responsefile file with your desired values:

- If you do not want to use the default value, remove the # character from the beginning of the line. Change the default value to the value that you want for that option. You *must* enclose all values in double quotation marks (“ ”).
- Use the option `<-P product.installLocation>` to define the default directory where you want the product installed. To use another destination directory, remove the # character from the corresponding line, and replace this default directory with the desired directory.
- The option `<-G checkPrerequisite>` enables checking the prerequisites. To disable checking the prerequisites, remove the # character from the corresponding line and change the value of the option to “no”.
- The option `<-G startUpgrade>` enables the installation of CIM Agent over a previous installation of CIM Agent having the same version (reinstall) or lower



version (upgrade). To do this, remove the # character from the corresponding line and change the value of the option to “yes”.

- The option `<-G stopProcessesResponse>` tells the install program whether or not to automatically stop SLP and CIM Agent services when reinstalling or upgrading the product. By default this option is set to “no”. If you do not change this default value, the reinstallation or upgrade will abort when these service are running.
  - To automatically stop the SLP and CIMOM, remove the # character from the corresponding line and change the value of the option to “yes”.
- The `<-G saveConfiguration>` option specifies whether to save the configuration settings (for example, user names, passwords, and device IP addresses) when reinstalling or upgrading the product. If you do not want to save the configuration settings when reinstalling or upgrading, remove the # character from the corresponding line and change the value of the option to “no”.
- The `<-W cimObjectManagerPorts.port>` option specifies the ESS CIM Agent server port. If you want to change the default value during installation, remove the # character from the corresponding line and change the default port value (5989) with the desired port value.
- The `<-W cimObjectManagerPorts.serverCommunication>` option specifies the ESS CIM Agent server communication protocol. If you want to change the default value during installation, remove the # character from the corresponding line and change the default server communication protocol (HTTPS) to HTTP protocol.

5. Save the modified responsefile in your desired directory.

6. To launch the wizard in unattended (silent) mode with the customized responsefile, type the following command from the Linux directory on your *CIM Agent for ESS* CD:

```
./setuplinux -options <responsefile-path>/responsefile
```

where *<response file path>* is the path of the responsefile file.

7. Wait for the wizard to complete the installation.

8. Check for installation errors in the install.log file. The log file is initially created in `/tmp/cimagent/install.log`. At the end of the installation, the log can be found in `<dest-path>/logs/install.log`, where *<dest-path>* is the destination directory where the CIM Agent was installed. If the installation ends before the creation of `<dest-path>` the log should be looked for in `/tmp/cimagent/install.log`. Your install.log file should look similar to the following:

```

(Oct 13, 2003 2:57:50 PM), This summary log is an overview of the sequence of the
installation of the IBM TotalStorage CIM Agent for ESS V1R2 1.2.0.1
(Oct 13, 2003 2:57:51 PM), The package rpm-build 4.0.4 7x.20 was found on your LINUX
system.
(Oct 13, 2003 2:57:51 PM), The package chkconfig 1.2.24 1 was found on your LINUX
system.
(Oct 13, 2003 2:57:51 PM), The package IBMesscli 2.3.0.13 0 was found on your LINUX
system.
(Oct 13, 2003 2:57:55 PM), IBM TotalStorage CIM Agent for ESS V1R2 installation
process started with the following install parameters:
Target Directory: /opt/IBM/cimagent
(Oct 13, 2003 2:57:59 PM), Copying Service Location Protocol Files ...
(Oct 13, 2003 2:57:59 PM), Copy file /opt/IBM/cimagent/slp/slp.conf to /etc/slp.conf .
(Oct 13, 2003 2:57:59 PM), Command to be executed:
/bin/ln -sf libslp.so.1.0.0 /opt/IBM/cimagent/slp/libslp.so
(Oct 13, 2003 2:57:59 PM), Command to be executed:
/bin/ln -sf libslp.so.1.0.0 /opt/IBM/cimagent/slp/libslp.so.1
(Oct 13, 2003 2:57:59 PM), Copy file /cdrom/LINUX/startup/slpdRed Hat to
/etc/init.d/slpd .
(Oct 13, 2003 2:57:59 PM), Command to be executed:
/sbin/chkconfig --add slpd
(Oct 13, 2003 2:58:01 PM), Copying CIM Object Manager Files ...
(Oct 13, 2003 2:58:12 PM), IBM CIM Object Manager - ESS port successfully updated.
(Oct 13, 2003 2:58:12 PM), IBM CIM Object Manager - ESS communication protocol
successfully updated.
(Oct 13, 2003 2:58:12 PM), The file setupCmdLine successfully updated.
(Oct 13, 2003 2:58:12 PM), Compile MOF files started ...
(Oct 13, 2003 2:59:31 PM), MOF files successfully compiled.
(Oct 13, 2003 2:59:31 PM), Generate a certificate store started ...
(Oct 13, 2003 3:00:13 PM), Certificate store called truststore successfully generated.
(Oct 13, 2003 3:00:13 PM), Copy file /cdrom/LINUX/startup/cimomRed Hat to
/etc/init.d/cimom .
(Oct 13, 2003 3:00:13 PM), Command to be executed:
/sbin/chkconfig --add cimom
(Oct 13, 2003 3:00:39 PM), The following services started successfully:
Service Location Protocol
IBM CIM Object Manager - ESS
(Oct 13, 2003 3:00:39 PM), INSTSUCC: The IBM TotalStorage CIM Agent for ESS V1R2 has
been successfully installed.

```

9. Close the command prompt window by entering a command, for example **exit**. Continue with the post installation tasks for the ESS CIM Agent in the following sections. “Verifying the CIM Agent installation on Linux” on page 47 is the next task. You can also continue the post installation tasks using the following option:
  - a. Open the LaunchPad from the Linux directory of the CIM Agent for ESS CD by typing `# ./launchpad_linux`.
  - b. Click **Post installation tasks** on the LaunchPad window. Continue with the post installation tasks for the ESS CIM Agent by following the instructions in this file.

#### Related topics:

- “Verifying the CIM Agent installation on Linux” on page 47
- “Installing the CIM Agent on Linux in graphical mode” on page 35
- “Configuring the CIM Agent on Linux” on page 48
- “Removing the CIM Agent on Linux” on page 52

---

## Verifying the CIM Agent installation on Linux

This section includes the steps necessary to verify that your CIM Agent is installed correctly on your Linux system.

### Steps:

Perform the following steps to verify your CIM Agent installation:

1. Verify the installation of the service location protocol (SLP).
  - a. Open an Command Prompt window and type the following command to verify that SLP is installed:

```
ps -ef | grep -v grep | grep slpd
```

If the SLP daemon is started, the following output is displayed:

```
daemon 16054 1 0 18:54 ? 00:00:00 /opt/IBM/cimagent/slp/slpd
```

2. Verify the installation of CIM Agent.
  - a. Check that the CIMOM daemon is installed and started by typing the following command:

```
ps -ef --columns 1000 | grep -E "com.ibm.cimom.CIMOM"
```

The following is a sample output of the command.

```
root 27696 27014 0 Oct08 ? 00:00:00 /opt/IBM/cimagent/ibmjava131/jre
/bin/exe/java -Xms128m -Xmx256m -cp /opt/IBM/cimagent/lib/xml4j-4_0_5/xercesImpl
.jar:/opt/IBM/cimagent/lib/xml4j-4_0_5/xmlParserAPIs.jar:/opt/IBM/cimagent/ibmja
va131/jre/lib/ext/ibmjsse.jar:/opt/IBM/cimagent/lib/JCE/IBMJCEfw.jar:/opt/IBM/ci
magent/lib/JCE/IBMJCEProvider.jar:/opt/IBM/cimagent/lib/JCE/local_policy.jar:/op
t/IBM/cimagent/lib/JCE/US_export_policy.jar:/opt/IBM/cimagent/lib/JCE/ibmpkcs.ja
r:/opt/IBM/cimagent/ibmjava131/jre/lib/rt.jar:/opt/IBM/cimagent/ibmica.jar:/opt/
IBM/cimagent/lib/logger.jar:/opt/IBM/cimagent/lib/ESSNIClient.jar:/opt/IBM/cimag
ent/lib/ESSNICCommon.jar:/opt/IBM/cimagent/lib/ESSNIServer.jar:/opt/IBM/cimagent/
lib/jlog.jar com.ibm.cimom.CIMOM -Prime
root 666 591 0 14:03 pts/3 00:00:00 grep -E com.ibm.cimom.CIMOM
[root@store03 root]#
```

- b. If the CIMOM is not started, issue the following command to run the **startcimom** file.

```
<dest-path>/startcimom
```

where *<dest-path>* is the destination directory where the CIM Agent is installed.

### Result:

If you are able to perform all of the verification tasks successfully, then the CIM Agent has been successfully installed on your Linux system.

### Related topics:

- “Configuring the CIM Agent on Linux” on page 48

---

## Configuring the CIM Agent on Linux

This section includes the steps to configure the CIM Agent after it has been successfully installed.

### Context:

This task is performed after successful installation of the CIM Agent. This installation program performs the following tasks:

- Copies the directories and files from the ESS CIM Agent CD-ROM into the chosen destination directory
- Updates some script files using the selected destination
- Compiles the MOF files, creates the persistent subdirectory in the destination directory
- Generates a certificate called **truststore** in the destination directory, only for the server

**Note:** For a client installation, you must copy this certificate from the server and install it in the destination directory on the client machine if you intend to run in secure mode.

### Steps:

Perform the following steps to configure the CIM Agent:

**Note:** In addition to the configuration steps below, you can use the **modifyconfig** command to change the configuration of some of the parameters that were configured during installation. You can change the CIM Agent port value, protocol (HTTP/HTTPS), and enable or disable the debug option. See “modifyconfig” on page 119 for a description of the **modifyconfig** command syntax.

1. Configure the CIM Agent for each ESS that the CIM Agent can access.

- a. Type the following command:

```
<dest-path>/setdevice
```

where *<dest-path>* is the destination directory where the CIM Agent is installed.

The following is a sample output:

```
Application setdevice started in interactive mode
To terminate the application enter: exit
To get a help message enter: help
>>>
```

- b. Obtain an IP address, user name, and password for each ESS that the CIM Agent will manage.
- c. Type the following command for each ESS:

```
>>>address <9.111.111.111> <essuser> <esspass>
```

where

- *9.111.111.111* represents the IP address of the Enterprise Storage Server
- *essuser* represents the Enterprise Storage Server Specialist user name

- *esspass* represents the Enterprise Storage Server Specialist password for the user name

The following is a sample output:

An ess provider entry for IP 9.111.111.111 successfully added

where *9.111.111.111* is the IP address.

- d. Type the following command for each ESS server configured for Copy Services:

```
>>> addessserver <9.111.111.111> <essuser> <esspass>
```

where

- *9.111.111.111* represents the IP address of the Enterprise Storage Server
- *essuser* represents the Enterprise Storage Server Specialist user name
- *esspass* represents the Enterprise Storage Server Specialist password for the user name

The following is a sample output:

An essserver entry for IP 9.111.111.111 successfully added

where *9.111.111.111* is the IP address.

- e. Type the **exit** command to exit the CIMOM configuration program. A file named *provider-cfg.xml* is created in the destination directory.
2. Once you have defined all of the ESS servers, you must stop and start the CIMOM to make the CIMOM initialize the settings for the ESS servers. Because the CIMOM collects and caches the information from the defined ESSs at startup time, the CIMOM might take longer to start the next time you start it.
3. Configure the CIMOM for each user that you want to have authority to use the CIMOM by running the CIMOM configuration program.

During the ESS CIM Agent installation, the default user name to access the ESS CIM Agent CIMOM is created. The default user name is “superuser” with a default password of “passw0rd”. You must use the default user name and password when using the **setuser** command for the first time after installation. Once you have added other users, you can initiate the **setuser** command using a user name that you defined instead of the default.

- a. Start the CIMOM, if it is not started, by typing the following command:

```
<dest-path>/startcimom
```

where *<dest-path>* is the destination directory where the CIM Agent is installed.

- b. Type the following command:

```
<dest-path>/setuser -u username -p password
```

where *<dest-path>* is the destination path where the CIM Agent is installed.

The following is a sample output:

```
Application setuser started in interactive mode
To terminate the application enter: exit
To get a help message enter: help
>>>
```

**Restriction:** You cannot delete or modify the current user that is logged in using the setuser command.

- c. Obtain a user name and password for each user that can manage the CIMOM. Type the following command for each user:

```
>>>adduser <cimuser> <cimpass>
```

where

- *cimuser* represents the new user name to access the ESS CIM Agent CIMOM
- *cimpass* represents the password for the new user name to access the ESS CIM Agent CIMOM

The following is a sample output:

```
An entry for user cimuser successfully added
```

where *cimuser* is your new user name.

- d. When you have completed adding new users to access the ESS CIM Agent CIMOM, issue the **exit** command.
- e. You can change the default password for “superuser” by starting the **setuser** command and providing a password for a user that was established in step c above. Issue the following command to change the password:

```
>>>chuser superuser <newpasswd>
```

where *newpasswd* is the new password for the superuser.

Or, remove the superuser by issuing the following command:

```
>>>rmuser superuser
```

- f. Type the **exit** command to exit the CIMOM configuration program.

### Result:

If you are able to perform all of the configuring tasks successfully, then the CIM Agent has been successfully installed on your Linux system.

### Related topics:

- “Verifying connection to the ESS” on page 51

---

## Configuring the CIM Agent to run in unsecure mode on Linux

Some vendor software might not be capable of communicating with the CIM Agent in a secure fashion. If you wish to, you can still use this vendor software by configuring the CIM Agent to run with only basic user and password security.

Perform the following steps to configure in unsecure mode:

1. Type the **stopcimom** command in the destination directory to stop the CIMOM.

- Find the `cimom.properties` file in the target directory and edit it with a tool such as `vi` editor. The following is an example:

```
ServerCommunication=HTTP
Port=5988
DigestAuthentication=False
```

- Type the **startcimom** command to restart the CIMOM.
- Verify that the server started on Port 5988 by opening the `cimom.log` file.

---

## Verifying connection to the ESS

This section includes the steps you need to perform to verify connection to the ESS.

### Prerequisites:

Before using the CIM Agent, verify that the ESS CLI software has network connectivity to the ESS by issuing the following command from a Command Prompt window:

```
esscli -u <essuser> -p <esspass> -s <9.111.111.111> list server
```

where:

- essuser* is an Enterprise Storage Server Specialist user name.
- esspass* is the Enterprise Storage Server Specialist password for that user name.
- 9.111.111.111* is the IP address of the Enterprise Storage Server.

**Note:** The ESS CLI does not set the `PATH` variable. Update the `PATH` environment variable using the path where the CLI for ESS 2105 is installed. See “Installing the ESS CLI on Linux” on page 33 for more information.

A response similar to the following is displayed:

```
Thu Oct 09 11:26:32 PDT 2003 IBM ESSCLI 2.3.0.1
```

| Server     | Model | Mfg | WWN              | CodeEC    | Cache | NVS | Racks |
|------------|-------|-----|------------------|-----------|-------|-----|-------|
| 2105.22232 | 800   | 013 | 5005076300C09470 | 2.3.0.357 | 8GB   | 2GB | 1     |

The installation, verification, and configuration of the CIM Agent need to be completed prior to this task. The tasks being performed are starting and verifying the Service Location Protocol (SLP) daemon, and starting and verifying the CIMOM.

### Steps:

Perform the following to start and verify the service location protocol (SLP) daemon and the CIMOM.

- If the SLP daemon is not started, type the following command from a separate Command Prompt window:

```
/etc/init.d/slpd start
```

This session will remain active until you stop it. You should keep it running as long as the CIM Agent is running.

- If the CIMOM is not started, start it by performing the following steps:
  - Run the `startcimom` file in a Command Prompt window, by typing the following command:

```
<dest-path>/startcimom
```

where *<dest-path>* is the destination directory where the CIM Agent is installed.

- b. The default is to start the secure CIMOM. It will register itself with SLP and accept requests on port 5989.
3. Enter the following command to locate all WBEM services (for example, CIMOMs) in the local network, display them and then call the CIMOMs on the local machine only requesting information about whether the CIMOMs know of any ESS.

Run the following command from a Command Prompt window:

```
<dest-path>/verifyconfig -u <user> -p <password>
```

Where *<user>* and *<password>* are the user and password of a cimom userid created with **setuser** command.

Here is a sample output:

```
verifyconfig -u guest -p guest
Verifying configuration of ESS CIM Agent...
Communicating with SLP to find WBEM services...
1 WBEM services found
 host=kirchhofer, port=5989
Connecting to ESS CIM Agent, host=kirchhofer, port=5989
Found 1 IBMTSESS_StorageSystem instances
Verification Successful
```

#### Result:

This completes the execution of the TotalStorage CIM Agent.

---

## Removing the CIM Agent on Linux

This optional task includes the steps necessary to remove the CIM Agent from your Linux system.

#### Steps:

Perform the following steps to remove the CIM Agent:

1. Log on as a user with root authority.
2. If the IBM CIM Object Manager Service and the Service Location Protocol services are started, you must stop them by typing the following command:

```
ps -ef --columns 1000 | grep -v "com/.ibm/.cimom/.CIMOM"
```

Output similar to the following is displayed:

```
root 52858 1 0 Oct 16 pts/7 2:29 /opt/IBM/ICAT/ibmjava131/jre/bin/
java -Xms128m -Xmx256m -cp /opt/IBM/ICAT/lib/xml4j-4_0_5/xercesImpl.jar:
/opt/IBM/ICAT/lib/xml4j-4_0_5/xmlParserAPIs.jar:/opt/IBM/ICAT/ibmjava131/
jre/lib/ext/ibmjse.jar:/opt/IBM/ICAT/lib/JCE/IBMJCEfw.jar:/opt/IBM/ICAT/
lib/JCE/IBMJCEProvider.jar:/opt/IBM/ICAT/lib/JCE/local_policy.jar:/opt/
IBM/ICAT/lib/JCE/US_export_policy.jar:/opt/IBM/ICAT/lib/JCE/ibmpkcs.jar:
/opt/IBM/ICAT/ibmjava131/jre/lib/rt.jar:/opt/IBM/ICAT/ibmica.jar com.
ibm.cimom.CIMOM
root 62884 40012 3 18:29:22 pts/7 0:00 grep cimom
```

If the CIMOM daemon is started, type the following command to stop it:



```
<dest-path>/stopcimom
```

where *<dest-path>* is the directory where the CIMOM daemon resides.

3. Type the following command to see if the SLP daemon is started:

```
ps -ef | grep slpd
```

```
daemon 61026 1 0 Oct 16 - 0:18 /opt/IBM/ICAT/slp/slpd
root 62884 40012 3 18:29:22 pts/7 0:00 grep slpd
```

```
kill 61026
```

4. Run the removal program in graphical mode (see “Removing in graphical mode”) or in unattended (silent) mode (see “Removing in unattended (silent) mode” on page 57) to remove the IBM CIM Object Manager Service and Service Location Protocol.

## Removing in graphical mode

Perform the following steps to remove the CIM Agent in graphical mode:

1. Type the following command to run the uninstall program from the **\_uninst** subdirectory:

```
cd <dest-path>/_uninst
uninstaller
```

where *<dest-path>* is the target directory where CIM Agent is installed.

2. If the wizard was not created during the CIM Agent installation, type the following command:

```
<dest-path>/ibmjava131/jre/bin/java -jar <dest-path>/_uninst/uninstall.jar
```

where *<dest-path>* is the target directory where CIM Agent is installed.

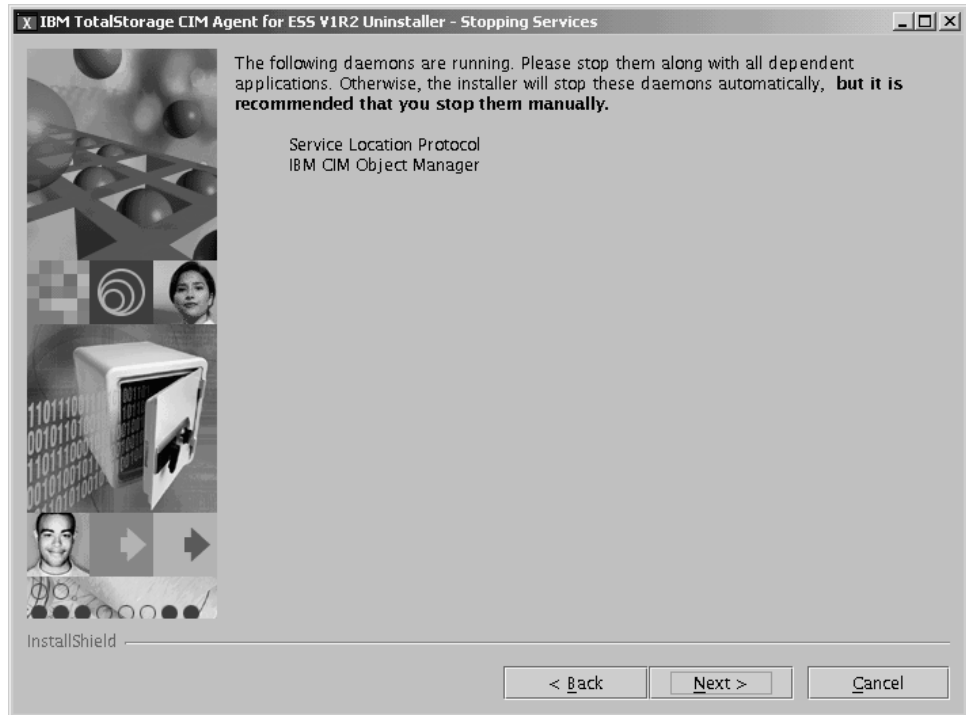
3. The Welcome window opens. Click **Next** to continue with the removal program, or click **Cancel** to exit the removal program.



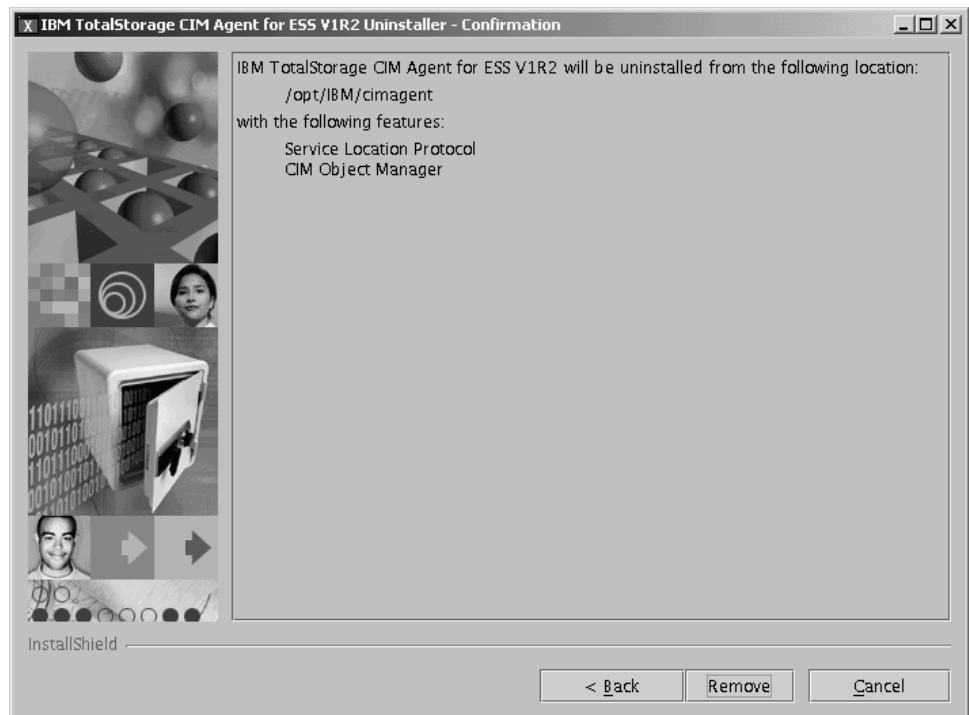
The program detects if the service location protocol (SLP) and the IBM CIM Object Manager (CIMOM) services are running and displays the following information:

- If the SLP and CIMOM are running, the Stopping Services window asks if you want to continue with the removal program. In that case, click **Next** to stop the services. Click **Cancel** to stop the services yourself (manually).
- If you want to manually stop the services, you must exit the removal program, stop the services and the applications that use them, and then run the removal program again from the beginning.

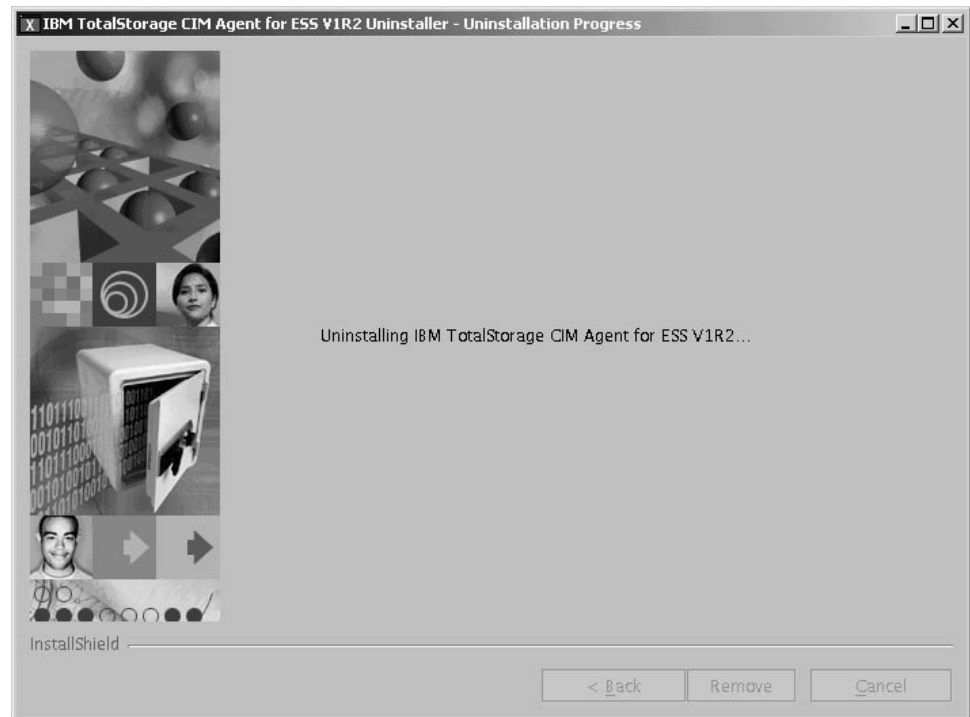
**Attention:** You must be careful if you have other applications that use the SLP service. If you do, you must stop these applications before you stop the SLP service because the SLP service is deleted during the removal process.



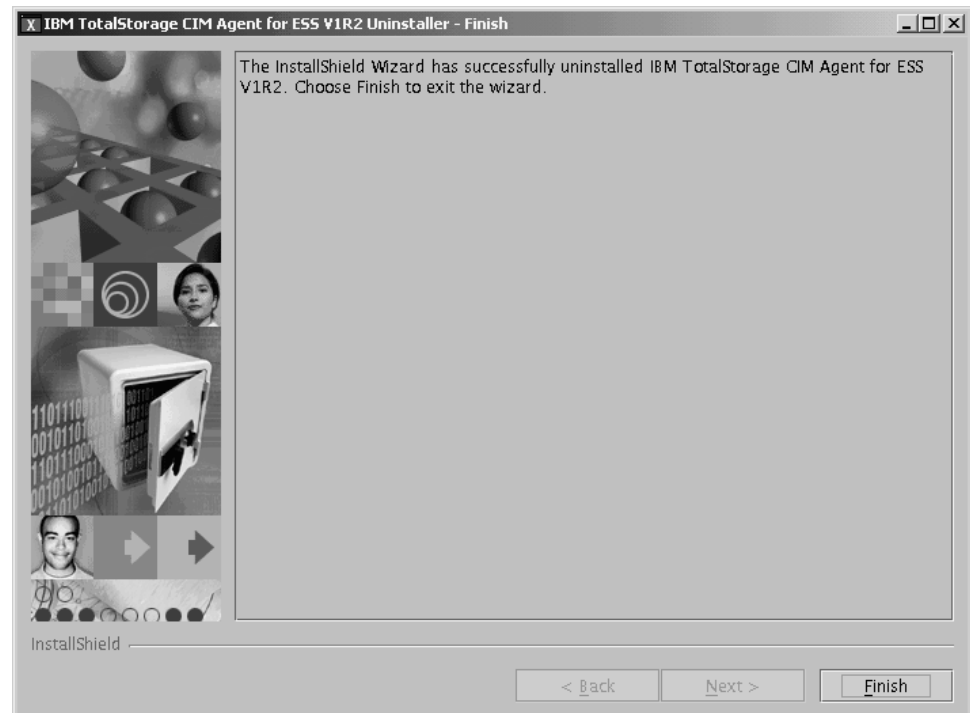
- If neither the SLP service nor the CIMOM service is running, the removal program continues with the Confirmation window.
4. The Confirmation window opens, displaying the location of the product that will be removed. Click **Remove** to continue with the removal program, or click **Cancel** to exit.



5. The Uninstallation Progress window opens. Wait for the program to remove the CIM Agent. If you do not want to continue with the removal, click **Cancel** to return to the Confirmation window.



6. The Finish window opens displaying information about the result of removal (successfully or failed).



Click **Finish** to end the removal program.

## Removing in unattended (silent) mode

### Steps:

Perform the following step to remove the CIM Agent in unattended (silent) mode:

1. You can invoke the unattended (silent) uninstall program by issuing the following commands:

```
<dest-path>/_uninst/uninstaller -silent
```

If the CIMOM Agent server or the Service Location Protocol are still running, the uninstall will fail. In this case, you must stop both of those services or run the uninstall program with *-G stopProcessesResponse="yes"*.

```
<dest-path>/_uninst/uninstaller -silent -G stopProcessesResponse="yes"
```

The removal program messages are logged in */tmp/cimagent/uninstall.log*.

### Post-processing requirements:

The CIM Agent removal process does not remove configuration files, logs, and similar files that are created during or after the installation process. They are located in the destination path where CIM Agent component was installed. For example, the default target directory is **/opt/IBM/cimagent**.

Remove the directory and all of its contents (especially if you plan to reinstall CIM Agent).

**Note:** If you want to keep the old configuration files, before removing them from the installation destination path, save them in another location on your system to restore them later.

To remove the directory *cimagent* you must type the following command:

```
rm -Rf /opt/IBM/cimagent
```

**Note:** The recursive remove is used in the example because the CIM Agent has a deep directory structure. The recursive remove is very powerful and dangerous. You must use the fully qualified directory name.



---

## Chapter 4. ESS CIM Agent for Windows

This chapter includes an overview of the installation process and instructions for installing and configuring the ESS CIM Agent on a Windows 2000, or later, operating system.

---

### Installation overview for Windows

This section provides an overview of the installation and configuration of the ESS CIM Agent on a Windows 2000, or later, operating system. Ensure that you have knowledge of how to administer a Windows 2000, or later, operating system before you install the ESS CIM Agent. Also be familiar with the commands that you use during installation and configuration of the ESS CIM Agent. See Chapter 5, “CIM Agent installation and configuration commands,” on page 85 for information about the commands.

The following list of installation and configuration tasks are in the order in which they should be performed:

1. Before you install the ESS CIM Agent for Windows, you should check the hardware and software requirements listed in “ESS CIM Agent installation requirements” on page 4.
2. Install the prerequisite ESS CLI software, as instructed in “Installing the ESS CLI for Windows” on page 60.  
**Attention:** If you are upgrading from a previous version of the ESS CIM Agent, you must uninstall the ESS CLI software that was required by the previous CIM Agent and reinstall the latest ESS CLI software, which is level 2.3.0.13.
3. You can choose to install the ESS CIM Agent either in graphical mode with the help of an installation wizard or in unattended mode (also known as silent mode), which involves customizing a response file and issuing a command.
  - a. If you want to install the ESS CIM Agent in graphical mode perform the instructions in “Installing the ESS CIM Agent on Windows in graphical mode” on page 61.
  - b. If you want to install the ESS CIM Agent in unattended mode perform the instructions in “Installing the ESS CIM Agent on Windows in unattended (silent) mode” on page 69.
4. Verify the installation by performing the instructions in “Verifying the ESS CIM Agent Windows installation” on page 71.
5. Configure the ESS CIM Agent for Windows by performing the instructions in “Configuring the ESS CIM Agent for Windows” on page 72. You might want to revisit this section in the future as you add, change, or delete CIMOM authentication and ESS information.
6. Configure the ESS CIM Agent to run in secure mode by performing the optional instructions in “Configuring the ESS CIM Agent to run in unsecure mode” on page 75. Verify connection to your ESS by performing the instructions in “Verifying connection to the ESS” on page 76.
7. Remove the ESS CIM Agent by performing the instructions in “Removing the ESS CIM Agent for Windows” on page 80. You only need to perform this optional task if you get errors during installation verification or if the ESS CIM Agent did not set the environment variables.

## Installing the ESS CLI for Windows

Before you install the ESS CIM Agent you must install the IBM TotalStorage Enterprise Storage System Command Line Interface (ESS CLI). The ESS CIM Agent installation program checks your system for the existence of the ESS CLI and reports that it cannot continue if the ESS CLI is not installed.

**Requirement:** You must have a minimum ESS CLI level of 2.3.0.13.

### Steps:

Perform the following steps to install the ESS CLI for Windows:

1. Insert the CD for the ESS CLI in the CD-ROM drive.

The ESS CLI software can be found on the CD with the label *ESS CLI*.

**Note:** The ESS CLI installation wizard detects if you have an earlier level of the ESS CLI software installed on your system and uninstalls the earlier level. After the uninstallation, you must restart the ESS CLI installation program to install the current level of the ESS CLI.

2. Open the document *IBM TotalStorage Enterprise Storage Server: Command-Line Interfaces User's Guide* on the *ESS CLI* CD. (The ESS CLI is referred as the Storage Management CLI in this Guide.)
3. Follow the instructions in the guide for installing the ESS CLI on a Windows operating system. The product you need can be found in the winCLI\IBMesscli subdirectory of the *ESS CLI* installation CD.
4. Respond **Yes** if you are prompted by the ESS CLI installation program to have it set the system path for you.
5. Reboot your system now or before proceeding with the ESS CIM Agent installation. You must do this because the ESS CLI is dependent on environmental variable settings which will not be effective for the ESS CIM Agent. This is because the CIM Agent runs as a service unless you reboot your system.
6. Verify that the ESS CLI is installed:
  - a. Click **Start** → **Settings** → **Control Panel**.
  - b. Double-click the **Add/Remove Programs** icon.
  - c. Verify that there is an "IBM ESS CLI" entry.
7. Verify that the ESS CLI is operational and can connect to the ESS. For example, from a command prompt window, issue the following command:

```
esscli -u essuser -p esspass -s 9.111.111.111 list server
```

where

- *9.111.111.111* represents the IP address of the Enterprise Storage Server
- *essuser* represents the Enterprise Storage Server Specialist user name
- *esspass* represents the Enterprise Storage Server Specialist password for the user name

The following response is displayed:

```
Thu Oct 09 11:22:28 PDT 2003 IBM ESSCLI 2.3.0.1
```

| Server     | Model | Mfg | WWN              | CodeEC    | Cache | NVS | Racks |
|------------|-------|-----|------------------|-----------|-------|-----|-------|
| 2105.22232 | 800   | 013 | 5005076300C09470 | 2.3.0.357 | 8GB   | 2GB | 1     |



## Post-processing requirements:

If the ESS CLI is installed, but the environmental variable PATH that is available to the parent process does not include the IBM ESS CLI directory location, the program might display an error message. This can occur when the ESS CLI is invoked from the IBM ESS CLI directory in the Command Prompt window that was opened before the ESS CLI was installed, for example:

```
C:\Program Files\IBM>esscli
"esscli" is not recognized as an internal or external command, operable program or batch file.
```

If the ESS CLI was recently installed, the INSTALL environmental variable will not be available to processes which started before the CLI installation such as Command Prompts or the Windows Services Manager. You may see the following message in a Command Prompt window which was started before the installation of the ESS CLI.

```
C:\Program Files\IBM ESS CLI>esscli
esscli: No value is specified for the <INSTALL> system variable. If the CLI was recently installed, it might be necessary to reboot in order to refresh the INSTALL environment variable.
```

**Note:** It is necessary to reboot in order to make the INSTALL environment variable available to Windows Services Manager before you run the ESS CIM Agent, otherwise the CIM Agent runs as a Windows Service otherwise.

If you receive error messages similar to these, you must reboot the system to ensure that the ESS CLI environmental variables take effect.

---

## Installing the ESS CIM Agent on Windows in graphical mode

This section includes the steps to install the ESS CIM Agent in your Windows system. If you choose to install the ESS CIM Agent in unattended mode skip this section and follow the instructions in "Installing the ESS CIM Agent on Windows in unattended (silent) mode" on page 69. You must satisfy all prerequisites listed in "ESS CIM Agent installation requirements" on page 4 before starting the installation.

### Steps:

Perform the following steps to install the ESS CIM Agent:

1. Log on to your system as the local administrator.
2. Insert the *CIM Agent for ESS* CD into the CD-ROM drive.

The ESS CIM Agent program should start within 15 - 30 seconds if you have autorun mode set on your system. If the LaunchPad window does not open, perform the following steps:

- a. Use a Command Prompt or Windows Explorer to change to the Windows directory on the CD.
- b. If you are using a Command Prompt window, type:  
LaunchPad
- c. If you are using Windows Explorer, double-click on the **LaunchPad.bat** file.

**Note:** If you are viewing the folder with Windows Explorer with the option selected to hide file extensions for known file types, find the LaunchPad file with the file type of MS-DOS Batch File.

- The following options are displayed when the LaunchPad window opens:

|                                |                                                                                              |
|--------------------------------|----------------------------------------------------------------------------------------------|
| <b>CIM Agent Overview</b>      | Offers information about the ESS CIM Agent                                                   |
| <b>Readme file</b>             | Offers any last minute product information that did not make it into this installation guide |
| <b>Installation guide</b>      | Offers instructions on how to install the ESS CIM Agent (a softcopy of this document)        |
| <b>License agreement</b>       | Offers information about the license for the ESS CIM Agent                                   |
| <b>CIM Agent Web site</b>      | Offers information from the product Web site                                                 |
| <b>Installation wizard</b>     | Starts the ESS CIM Agent installation program                                                |
| <b>Post installation tasks</b> | Offers information about configuring users and device communication                          |
| <b>Exit</b>                    | Exits the ESS CIM Agent LaunchPad program                                                    |



Figure 5. LaunchPad window

- Click the **Readme file** from the LaunchPad window or from the **README.txt** file located in the doc or Windows directory on the CIM Agent for ESS CD to check for information that might supersede the information in this guide.
- Click **Installation wizard** from the LaunchPad window to start the installation.

**Note:** The LaunchPad window remains open behind the installation wizard so that you can access product information during the installation process. Click **Exit** if you want to close the LaunchPad.

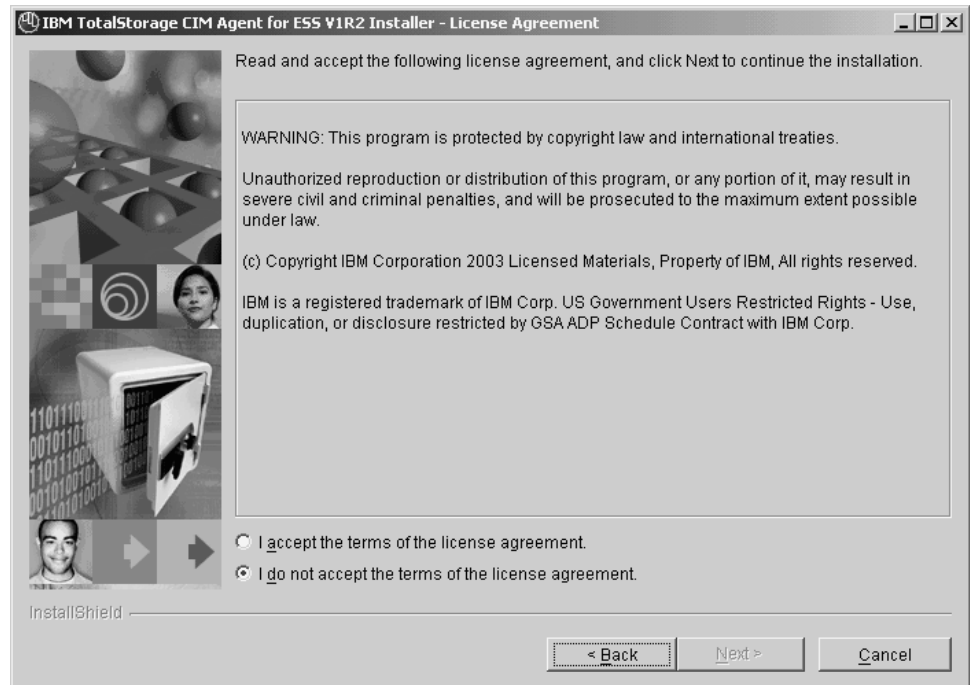
6. There might be a slight delay while the software loads on your system. After the software loads a DOS prompt window opens to display the following message:

```
Initializing InstallShield Wizard...
Preparing Java (tm) Virtual Machine
.....
```

7. The Welcome window opens suggesting what documentation you should review prior to installation. Click **Next** to continue, or click **Cancel** to exit the installation.



8. The License Agreement window opens. Read the license agreement information. Select **I accept the terms of the license agreement**, then click **Next** to accept the license agreement. Otherwise, keep the selection **I do not accept the terms of the license agreement** (it is the default) and click **Cancel** to exit the installation.



9. The Product Installation Check window opens and the wizard verifies that your machine meets the installation requirements.
  - If you have a service location protocol (SLP) service that is different from the SLP that the ESS CIM Agent requires, the installation wizard displays an error and asks you to stop the installation and remove this SLP service from the system.
  - If the installation wizard detects an SLP Windows service that was previously installed by a different CIM Agent (for example, SVCC or SVCCisco), the Service Location Protocol Check window opens. If you would like to use the ESS CIM Agent SLP, you must uninstall the previously installed SLP and then proceed with the installation of the ESS CIM Agent SLP. Otherwise, continue the ESS CIM Agent installation using the existing SLP. In this case, the ESS CIM Agent SLP files are copied to the hard disk and the SLP is not installed as a Windows service.
  - The installation wizard checks if the ESS CLI client is installed on your machine at a version level which is at or above the minimum prerequisite level.
  - The wizard checks whether a version of the CIM Agent is already installed. If the CIM Agent is installed, it checks whether the SLP service and the IBM CIM Object Manager (CIMOM) service are started. If these services are started and you want to continue the installation program, select the **Next** button. Or, if you want to exit the installation program, select the **Cancel** button. If you choose to continue, you must stop all of the daemons and dependent applications that use these services. You can save the old configuration settings (for example, user names, passwords, and device IP addresses) by selecting the check box that you see on the window.



10. The Destination Directory window opens. Select one of the following options:
  - a. Click **Next** to accept the default directory.
  - b. Click **Browse** to select a different directory for installation and then click **Next** to continue the installation process.
  - c. Click **Cancel** to exit the installation process.



### Notes:

- a. The Destination Directory window is displayed only if a version of CIM Agent is not already installed. Otherwise, the CIM Agent is reinstalled or upgraded to the same install location.
  - b. If the program detects insufficient space for the ESS CIM Agent installation in the chosen destination, an error message is displayed. You can free some space on the destination drive and then click **Next** or you can stop the installation program by clicking **Cancel**. You can also go back by clicking **Back**, and choose another destination directory for the product.
11. The Updating CIMOM Port window opens. Click **Next** to accept the default port. If the default port is the same as another port already in use, modify the default port and click **Next**. Use the following command to check which ports are in use:

```
netstat -a
```

Or, click **Cancel** to exit the wizard.

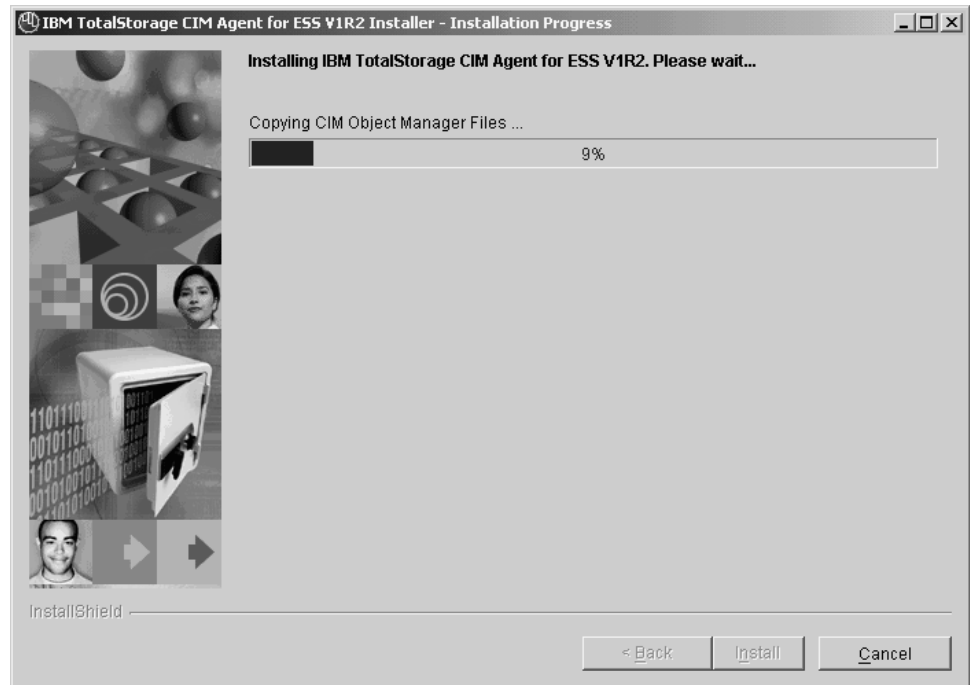


12. The Installation Confirmation window opens. Click **Install** to confirm the installation location and file size. Click **Cancel** to exit the installation wizard or go back to the previous window by clicking **Back**.

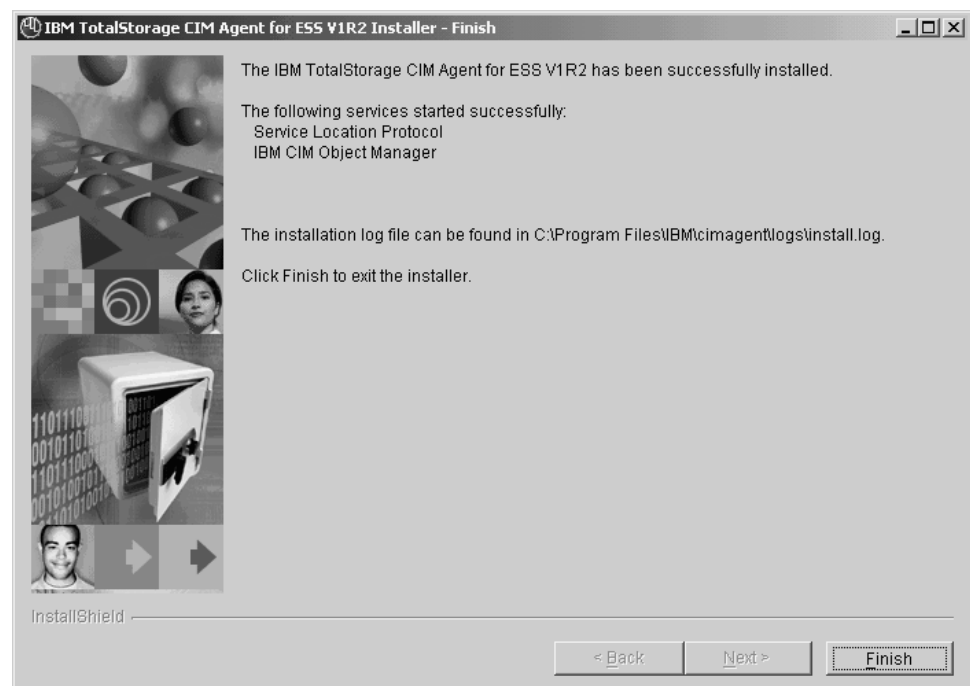


13. The Installation Progress window opens indicating how much of the installation has been completed. Installation usually takes 3 - 10 minutes depending on the configuration of your machine. You can click **Cancel** to exit the installation wizard.

**Note:** If you click **Cancel** a popup window opens asking you to confirm the cancellation of the installation wizard: "Cancel the current operation? **Yes No**". Be aware that if you confirm the cancellation by clicking Yes, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.



14. When the Installation Progress window closes, the **Finish** window opens. Check the **View post installation tasks** check box if you want to continue with post installation tasks when the wizard closes. Before proceeding, you might want to review the log file for any possible error messages. The log file is located in `xxx\logs\install.log`, where `xxx` is the destination directory where the ESS CIM Agent for Windows is installed. The `install.log` contains a trace of the installation actions.
15. Click **Finish** to exit the installation wizard.





**Note:** Ordinarily, you do not need to restart your system during or after the installation of the ESS CIM Agent. However, the installation wizard might determine that a restart is necessary. Restart your system if required. After you restart the system, the installation wizard continues with the installation.

16. Exit the LaunchPad program by clicking **Exit** on the LaunchPad window. If you have not done so already, continue with the post installation tasks for the ESS CIM Agent using the instructions in the following sections. “Verifying the ESS CIM Agent Windows installation” on page 71 is the next task. You can also continue the post installation tasks using the following option:
  - a. Click **Post installation tasks** on the LaunchPad window.
  - b. Continue with the post installation tasks for the ESS CIM Agent by following the instructions in this file.

**Related topics:**

- “Installing the ESS CIM Agent on Windows in unattended (silent) mode”
- “Verifying the ESS CIM Agent Windows installation” on page 71
- “Configuring the ESS CIM Agent for Windows” on page 72
- “Configuring the ESS CIM Agent to run in unsecure mode” on page 75
- “Verifying connection to the ESS” on page 76
- “Removing the ESS CIM Agent for Windows” on page 80

---

## Installing the ESS CIM Agent on Windows in unattended (silent) mode

The unattended (silent) install option allows you to run installation unattended. Use this method of installation to customize a response file and issue a command from a command prompt window. The response file is a template on the ESS CIM Agent CD. You can also create a standard response file to ensure that the product is installed consistently on multiple systems. You must satisfy all prerequisites listed in “ESS CIM Agent installation requirements” on page 4 before starting the installation.

**Steps:**

Perform the following steps to install the ESS CIM Agent in your Windows environment using the unattended mode:

1. Log on as local administrator user.
2. Insert the CIM Agent for ESS CD.
3. Locate the response file (named *responsefile*) on your CIM Agent for ESS CD in the W2K directory.
4. Using Windows Explorer or a command prompt, copy the response file to your hard drive.
5. Using a text editor modify the default options in the response file with the values you want:
  - Remove the # character from the beginning of a line if you do not want to use the default value. Change the default value to the value that you want for that option. You *must* enclose all values in double quotation marks (“”).
  - The *<-P product.installLocation>* option defines the default directory where the product is to be installed. To specify a destination directory other than the default, remove the # character from the corresponding line and replace the default directory with the desired directory.

- The `<-G checkPrerequisite>` option checks the prerequisites. If you want to disable this option, remove the # character from the corresponding line and change the value of the option to no.
  - The `<-G startUpgrade>` option enables the installation of the CIM Agent over a previous installation of CIM Agent having the same version (reinstall) or lower version (upgrade). If you want to enable this option, remove the # character from the corresponding line and change the value of the option to yes.
  - The `<-G stopProcessesResponse>` option tells the install program whether to automatically stop SLP and CIM Agent services when you reinstall or upgrade the product. By default this option is set to no. If you do not change this default value, the reinstallation or upgrade stops when these service are running. If you want to automatically stop the SLP and CIMOM, remove the # character from the corresponding line and change its value to yes.
  - The `<-G saveConfiguration>` option specifies whether to save the configuration settings (for example, user names, passwords, and device IP addresses) when reinstalling or upgrading the product. If you do not want to save the configuration settings when reinstalling or upgrading, remove the # character from the corresponding line and change the value of the option to no.
  - The `<-W cimObjectManagerPorts.port>` option specifies the ESS CIM Agent server port. If you want to change the default value during installation, remove the # character from the corresponding line and change the default port value (5989) with the desired port value.
  - The `<-W cimObjectManagerPorts.serverCommunication>` option specifies the ESS CIM Agent server communication protocol. If you want to change the default value during installation, remove the # character from the corresponding line and change the default server communication protocol (HTTPS) to HTTP protocol.
6. Save the modifications to the **responsefile** file. Save the file *without* a file extension such as .txt.
  7. From a command prompt window, type the following command:
 

```
<CD drive path>\W2K\install -options <response file path>\responsefile
```

where `<CD drive path>` is the path of your CD-ROM drive. `<response file path>` is the path of the responsefile file that you copied in step 4 on page 69 and customized in step 5 on page 69.

8. During the installation you will see dotted lines scrolling across the screen. When the installation program ends you see the cursor.
9. Check for installation errors in the install.log file. After all the prerequisites checks have been performed, the log file is copied to the `<dest-path>\logs` directory. This file can be found in the `<dest-path >\logs\` directory.. This file is initially created in the system temporary file under the subdirectory cimagent. The following is an example of an install.log file:

```

(Oct 13, 2003 11:35:58 AM), This summary log is an overview of the sequence of the
installation of the IBM
TotalStorage CIM Agent for ESS V1R2 1.2.0.1
(Oct 13, 2003 11:36:11 AM), IBM TotalStorage CIM Agent for ESS V1R2 installation
process started with the following install parameters:
Target Directory: "C:\Program Files\IBM\cimagent"
(Oct 13, 2003 11:36:13 AM), Copying Service Location Protocol Files ...
(Oct 13, 2003 11:36:14 AM), Service Location Protocol successfully installed
(Oct 13, 2003 11:36:14 AM), Copying CIM Object Manager Files ...
(Oct 13, 2003 11:37:06 AM), IBM CIM Object Manager - ESS port successfully updated.
(Oct 13, 2003 11:37:06 AM), IBM CIM Object Manager - ESS communication protocol
successfully updated.
(Oct 13, 2003 11:37:06 AM), The file setupCmdLine.bat successfully updated.
(Oct 13, 2003 11:37:06 AM), Compile MOF files started ...
(Oct 13, 2003 11:38:18 AM), MOF files successfully compiled.
(Oct 13, 2003 11:38:18 AM), Generate a certificate store started ...
(Oct 13, 2003 11:38:27 AM), Certificate store called truststore successfully generated.
(Oct 13, 2003 11:38:27 AM), IBM CIM Object Manager - ESS successfully installed
(Oct 13, 2003 11:38:36 AM), Command to be executed : net start cimomsrv
(Oct 13, 2003 11:38:46 AM), The following services started successfully:
Service Location Protocol
IBM CIM Object Manager - ESS
(Oct 13, 2003 11:38:46 AM), INSTSUCC: The IBM TotalStorage CIM Agent for ESS V1R2 has
been successfully installed.

```

10. Close the command prompt window by entering a command, for example **exit**. Continue with the post installation tasks for the ESS CIM Agent using the instructions in the following sections. “Verifying the ESS CIM Agent Windows installation” is the next task. You can also continue the post installation tasks using the following option:
  - a. Open the LaunchPad from the command prompt window by typing LaunchPad.
  - b. Click **Post installation tasks** on the LaunchPad window. Continue with the post installation tasks for the ESS CIM Agent by following the instructions in this file.

#### Related topics:

- “Verifying the ESS CIM Agent Windows installation”
- “Installing the ESS CIM Agent on Windows in graphical mode” on page 61
- “Configuring the ESS CIM Agent for Windows” on page 72
- “Configuring the ESS CIM Agent to run in unsecure mode” on page 75
- “Verifying connection to the ESS” on page 76
- “Removing the ESS CIM Agent for Windows” on page 80

---

## Verifying the ESS CIM Agent Windows installation

This task verifies that your ESS CIM Agent is installed correctly on your Windows system.

#### Steps:

Perform the following steps to verify your ESS CIM Agent installation:

1. Verify the installation of the Service Location Protocol (SLP).
  - a. Verify that the Service Location Protocol is started. Select **Start -> Settings -> Control Panel**. Double-click the **Administrative Tools** icon. Double-click the **Services** icon.

- b. Find **Service Location Protocol** in the Services window list. For this component, the Status column should be marked **Started** and the Startup Type column should be marked **Manual**.
  - c. If SLP is not started, right-click on the SLP and select **Start** from the pop-up menu. Wait for the Status column to be changed to **Started**.
  - d. Do not close the Services window because you will also use it to verify the CIM object manager (CIMOM) service.
2. Verify the installation of the ESS CIM Agent.
  - a. Verify that the CIMOM service is started. If you closed the Services window, select **Start -> Settings -> Control Panel**. Double-click the **Administrative Tools** icon. Double-click the **Services** icon.
  - b. Find the **IBM CIM Object Manager - ESS** in the Services window list. For this component, the Status column should be marked **Started** and the Startup Type column should be marked **Automatic**.
  - c. If the IBM CIM Object Manager is not started, right click on the **IBM CIM Object Manager - ESS** and select **Start** from the pop-up menu. Wait for the Status column to change to **Started**.
  - d. Close the Services window.
  - e. Close the Administrative Tools window.

**Result:**

If you are able to perform all of the verification tasks successfully, the ESS CIM Agent has been successfully installed on your Windows system. Next, perform the configuration tasks in “Configuring the ESS CIM Agent for Windows.”

**Related topics:**

- “Configuring the ESS CIM Agent for Windows”
- “Configuring the ESS CIM Agent to run in unsecure mode” on page 75
- “Verifying connection to the ESS” on page 76
- “Removing the ESS CIM Agent for Windows” on page 80

---

## Configuring the ESS CIM Agent for Windows

This task configures the ESS CIM Agent after it has been successfully installed. This section repeats the instructions in the Post Installation Tasks option that you open from the LaunchPad window (see Figure 5 on page 62).

## Steps:

Perform the following steps to configure the ESS CIM Agent:

**Note:** In addition to the configuration steps below, you can use the **modifyconfig** command to change the configuration of some of the parameters that were configured during installation. You can change the CIM Agent port value, protocol (HTTP/HTTPS), and enable or disable the debug option. See “modifyconfig” on page 119 for a description of the **modifyconfig** command syntax.

1. Configure the ESS CIM Agent for each Enterprise Storage Server to which the ESS CIM Agent can have access. Open a Command Prompt window and change directory into the ESS CIM Agent directory, for example: C:\Program Files\IBM\cimagent. Type the following command to start the interactive **setdevice** tool to identify ESSs servers to the CIMOM:

```
setdevice
```

Obtain an IP address, user name, and password for each device (such as, an ESS) that the ESS CIM Agent is to manage:

- a. Type the following command for each ESS:

```
>>>address 9.111.111.111 essuser esspass
```

where

- *9.111.111.111* represents the IP address of the Enterprise Storage Server
- *essuser* represents the Enterprise Storage Server Specialist user name
- *esspass* represents the Enterprise Storage Server Specialist password for the user name

The following is a sample output:

```
An ess provider entry for IP 9.111.111.111 successfully added
```

where *9.111.111.111* is the IP address.

- b. Type the following command for each ESS server that is configured for Copy Services:

```
>>> addressserver 9.111.111.111 essuser esspass
```

where

- *9.111.111.111* represents the IP address of the Enterprise Storage Server
- *essuser* represents the Enterprise Storage Server Specialist user name
- *esspass* represents the Enterprise Storage Server Specialist password for the user name

The following is a sample output:

```
An essserver entry for IP 9.111.111.111 successfully added
```

where *9.111.111.111* is the IP address.

2. Repeat step 1 for each additional device (an ESS) that you want to configure.
3. Close the **setdevice** interactive session by typing **exit**.

4. Once you have defined all the ESS servers, you must stop and restart the CIMOM to make the CIMOM initialize the information for the ESS servers. Because the CIMOM collects and caches the information from the defined ESS servers at startup time, the starting of the CIMOM might take a longer period of time the next time you start it.

Perform the following steps to use the Windows Start Menu facility to stop and restart the CIMOM:

- a. Stop the CIMOM by selecting **Start -> Programs -> IBM TotalStorage CIM Agent for ESS -> Stop CIMOM service**. A Command Prompt window opens to track the stoppage of the CIMOM.

**Note:** You might see an error message popup window labeled “java.exe - Application Error”. You must click **OK** to close that window to continue.

If the CIMOM has stopped successfully, the following message is displayed:

The IBM CIM Object Manager - ESS service was stopped successfully.

Press any key to close the Command Prompt Window.

- b. Restart the CIMOM by selecting **Start -> Programs -> IBM TotalStorage CIM Agent for ESS -> Start CIMOM service**. A Command Prompt Window opens to track the progress of the starting of the CIMOM.

The restarting of the CIMOM may take a while because it is connecting to the defined ESS servers and is caching that information for future use. If the CIMOM has started successfully, the following message displayed:

The IBM CIM Object Manager - ESS service was started successfully.

Press any key to close the Command Prompt Window.

5. Use the **setuser** interactive tool to configure the CIMOM for the users who will have the authority to use the CIMOM.

**Note:** The users which you will configure to have authority to use the CIMOM are uniquely defined to the CIMOM software and have no required relationship to operating system user names, the ESS Specialist user names, or the ESS Copy Services user names.

Upon installation of the CIM Agent for ESS, the provided default user name is “superuser” with a default password of “passw0rd”. The first time you use the **setuser** tool, you must use this user name and password combination. Once you have defined other user names, you can start the **setuser** command by specifying other defined CIMOM user names.

**Note:** The CIMOM must have been started to run the **setuser** command.

- a. Open a Command Prompt window and change directory to the ESS CIM Agent directory, for example:

C:\Program Files\IBM\cimagent

- b. Type the following command at the command prompt to start the **setuser** interactive session to identify users to the CIMOM:

setuser -u superuser -p passw0rd

- c. Type the following command in the **setuser** interactive session to define new users:

```
>>>adduser cimuser cimpass
```

where

- *cimuser* represents the new user name to access the ESS CIM Agent CIMOM
- *cimpass* represents the password for the new user name to access the ESS CIM Agent CIMOM

The following is a sample output:

```
An entry for user cimuser successfully added
```

where *cimuser* is your new user name.

**Restriction:** You cannot delete or modify the current user who started the **setuser** interactive session.

6. Repeat step 5c for each additional user name that you want to configure.
7. You can change the default password for “superuser” by starting the **setuser** command and providing a user name and password. Then, issue the **setuser** interactive session command to change the password for the superuser:

```
>>>chuser superuser newpasswd
```

where *newpasswd* is the new password for the superuser.

You can also delete the superuser by issuing the following **setuser** interactive session command:

```
>>>rmuser superuser
```

8. Close the **setdevice** interactive session by typing **exit**.

**Note:** Unlike the **setdevice** actions, you do not need to stop and restart the CIMOM to make the **setuser** actions take effect.

**Result:**

If you were able to perform all of the configuring tasks successfully, the ESS CIM Agent has been successfully installed and configured on your Windows system.

**Related topics:**

- “Configuring the ESS CIM Agent to run in unsecure mode”
- “Verifying connection to the ESS” on page 76
- “Removing the ESS CIM Agent for Windows” on page 80

---

## Configuring the ESS CIM Agent to run in unsecure mode

Some vendor software might not be capable of communicating with the ESS CIM Agent in a secure fashion. If you wish to, you can still use this vendor software by configuring the ESS CIM Agent to run with only basic user and password security.



## Steps:

Perform the following steps to configure the ESS CIM Agent to run in unsecure mode:

1. Using the Windows Start Menu facility, stop the CIMOM by selecting **Start -> Programs -> IBM TotalStorage CIM Agent for ESS -> Stop CIMOM service**.
2. Using the Windows Services facility, stop and start the Service Location Protocol (SLP) service by selecting **Start -> Settings -> Control Panel**. Double-click **Administrative Tools** and double click **Services**. Right click **Service Location Protocol** in the Name column and select **Stop** in the menu. After the SLP stops, start it again by right-clicking on Service Location Protocol in the Name column and selecting **Start** in the menu. After the SLP starts, close the Services Window and the Administrative Tools Window.
3. Find the cimom.properties file and edit it with a tool such as notepad, setting the properties as shown in the following example:

```
Port=5988
ServerCommunication=HTTP
DigestAuthentication=False
```

Once the CIMOM starts, it accepts requests over HTTP using basic authentication.

**Note:** To completely disable security checking, set “Authorization=False ” in the cimom.properties file.

4. Using the Windows Start Menu facility, restart the CIMOM by selecting **Start -> Programs -> IBM TotalStorage CIM Agent for ESS -> Start CIMOM service**. The CIMOM registers itself with SLP using the revised attributes.
5. Close this window by pressing any key when you are prompted by the following display:

```
The IBM CIM Object Manager service is starting
The IBM CIM Object Manager service was started successfully
Press any key to continue ...
```

## Related topics:

- “Verifying connection to the ESS”
- “Removing the ESS CIM Agent for Windows” on page 80

---

## Verifying connection to the ESS

During this task the ESS CIM Agent software connects to the Enterprise Storage Server (ESS) that you identified in the configuration task. The connection to the ESS is through the ESS CLI software. If the network connectivity fails or if the user name and password that you set in the configuration task is incorrect, the ESS CIM Agent cannot connect successfully to the ESS. The installation, verification, and configuration of the ESS CIM Agent must be completed before you verify the connection to the ESS.

1. Verify that you have network connectivity to the ESS from the system where the ESS CIM Agent is installed. To do this, perform the following steps:
  - a. Open a Command Prompt Window.
  - b. Issue a **ping** command to the ESS, for example:



```
ping 9.11.111.111
```

where 9.11.111.111 is the ESS IP address

- c. Check that you can see reply statistics from the ESS IP address. The following is example output:

```
Pinging 9.11.111.111 with 32 bytes of data:
Reply from 9.11.111.111: bytes=32 time<10ms TTL=255
Reply from 9.11.111.111: bytes=32 time<10ms TTL=255
Reply from 9.11.111.111: bytes=32 time<10ms TTL=255
Reply from 9.11.111.111: bytes=32 time<10ms TTL=255
```

If you see other messages indicating that the request has timed out, see your Network Administrator for help on establishing network connectivity from the system where the ESS CIM Agent is installed.

2. Using the Windows Services Facility, verify that the SLP is active by selecting **Start -> Settings -> Control Panel**. Double-click the **Administrative Tools** icon. Double-Click the **Services** icon.
  - Find the Service Location Protocol (SLP) in the Name column.  
For this component, the Status column should be marked **Started** and the Startup Type column should be marked **Manual**.
  - If SLP is not started, right click on **Service Location Protocol** and click **Start** from the popup menu. Wait for the Status to change to **Started**.
  - Close the Services window and the Administrative Tools window.
3. Verify that the CIMOM is active by selecting **Start -> Programs -> IBM TotalStorage CIM Agent for ESS->Start CIMOM service**. A Command Prompt window opens to start the CIMOM. If the CIMOM is already started, the following message is displayed:

```
The requested service has already been started.
```

Otherwise, the window tracks the progress of the starting of the CIMOM. Be aware that the starting of the CIMOM might take a while because it is connecting to the defined ESS servers and is caching that information for future use. When the CIMOM has completed starting, the following message is displayed:

```
The IBM CIM Object Manager - ESS service was started successfully
```

Press any key to close the Command Prompt Window.

4. Verify CIMOM registration with SLP by selecting **Start->Programs->TotalStorage CIM Agent for ESS->Check CIMOM Registration**. The window closes when you press any key, as instructed in the output:

```
service: wbem:http://tpc035/ 5988, 65535
press any key to continue...
```

**Note:** If the verification of the CIMOM registration is not successful, stop and restart the SLP and CIMOM services.

5. Use the **verifyconfig** command to locate all WBEM services in the local network. This command verifies that you have configured the ESS CIM Agent and can connect to at least one ESS.

Type the **verifyconfig** command in another command prompt window in the directory where the ESS CIM Agent was installed, for example:

```
c:\program files\ibm\cimagent
verifyconfig -u <username> -p <password>
```

where *username* is the user name and *password* is the password for the user name that you configured to manage the CIMOM.

If successful, output similar to the following is displayed:

```
C:\program files\ibm\cimagent>verifyconfig -u guest -p guest
Verifying configuration of ESS CIM Agent...
Communicating with SLP to find WBEM services...
1 WBEM services found
 host=kirchhofer, port=5989
Connecting to ESS CIM Agent, host=kirchhofer, port=5989
Found 1 IBMTSESS_StorageSystem instances
Verification Successful
```

You might run into the following errors:

- Error Type 1. E CMMOM0002E CIM\_ERR\_ACCESS\_DENIED

If you enter an invalid CIMOM user name or password or forget to pass the CIMOM user name or password on the invocation of **verifyconfig**, the following message series is displayed near the end of the output messages:

```
E CMMOM0002E CIM_ERR_ACCESS_DENIED
 at com.ibm.http.HTTPClient.sendRequest(Unknown Source)
 at com.ibm.http.HTTPClient.sendRequest(Unknown Source)
 at com.ibm.xml.XMLOperationGeneric.intrinsicMethod(Unknown Source)
 at com.ibm.xml.XMLOperationGeneric.intrinsicMethod(Unknown Source)
 at com.ibm.xml.XMLEnumerateInstances.enumInstances(Unknown Source)
 at com.ibm.xml.CIMOMHandleXML.enumInstances(Unknown Source)
 at com.ibm.cim.CIMClient.enumInstances(Unknown Source)
 at com.ibm.cimom.install.VerifyConfig.enumInstances(Unknown Source)
 at com.ibm.cimom.install.VerifyConfig.enumInstances(Unknown Source)
 at com.ibm.cimom.install.VerifyConfig.main(Unknown Source)
FAILED requesting IBMTSESS_StorageSystem instances
```

- Error Type 2. ESS CIM Agent not correctly configured

If any of the following are true:

- You have never used the **setdevice** tool to define an ESS to the CIMOM
- You made an error in the ESS IP address, user name, or password
- You did not restart the CIMOM after adding the ESS

the following message series is displayed near the end of the output messages:

```
Connecting to ESS CIM Agent, host=1.11.111.111, port=5689
Found 0 IBMTSESS_StorageSystem instances
ESS CIM Agent not correctly configured
```

You can find more information about the possible cause of this error message by examining the **cimomx.log** (where *x* can be a number from 1 - 9).

If you have a network connection problem or you have set an incorrect IP address for the ESS while using the **setdevice** tool, the ESS CLI cannot connect to the ESS. A message pair similar to the following can appear in the log:

```
2003-10-30 08:37:03,PST-08:00 E CIMOM[com.ibm.provider.ess.EssCLICmdHandler.
outputEssCliError(Unknown Source)]: ESSCLI Error
[java.lang.Object{esscli 204: The connection to the specified server was
not established.}]

2003-10-30 08:37:03,PST-08:00 E CIMOM[com.ibm.provider.ess.EssProvider.initialize
(Unknown Source)]: esscli list server failed for 9.43.227.19,
trying again... [java.lang.Object{Operation Failed. RC=2}]
```

If you have entered an incorrect user name or password for the ESS while using the **setdevice** tool, the ESS CLI can connect to the ESS but will not be able to authenticate. A message pair similar to the following can appear in the log:

```
2003-10-30 10:32:53,PST-08:00 E CIMOM[com.ibm.provider.ess.EssCLICmdHandler.
outputEssCliError(Unknown Source)]: ESSCLI Error
[java.lang.Object{esscli 510: Access was denied by the server.}]

2003-10-30 10:32:53,PST-08:00 E CIMOM[com.ibm.provider.ess.EssProvider.initialize
(Unknown Source)]: esscli list server failed for 9.43.227.19,
trying again... [java.lang.Object{Operation Failed. RC=5}]
```

If you did not reboot after installing the ESS CLI or before you ran the ESS CIM Agent **verifyconfig** program, the ESS CLI will have a problem finding an environmental variable. A message similar to the following can appear in the log:

```
2003-10-29 17:26:02.608-08:00 [java.lang.Object{esscli: No value is
specified for the <INSTALL> system variable.}] I
CIMOM[com.ibm.provider.ess.EssProvider.initialize(Unknown Source)]:
store01.storage.sanjose.ibm.com IP esscli list server failed, tryin again...
```

- Error Type 3. E CMMOM0001E CIM\_ERR\_FAILED(E CMMOM0001E CIM\_ERR\_FAILED)

If you have not installed the ESS CLI on your system, the following message series is displayed near the end of the output messages:

```
Connecting to ESS CIM Agent, host=1.11.111.11, port=5689
E CMMOM0001E CIM_ERR_FAILED(E CMMOM0001E CIM_ERR_FAILED)
 at com.ibm.xml.XMLOperationGeneric.processReturnStream(Unknown Source)
 at com.ibm.xml.XMLOperationGeneric.intrinsicMethod(Unknown Source)
 at com.ibm.xml.XMLOperationGeneric.intrinsicMethod(Unknown Source)
 at com.ibm.xml.XMLEnumerateInstances.enumInstances(Unknown Source)
 at com.ibm.xml.CIMOMHandleXML.enumInstances(Unknown Source)
 at com.ibm.cim.CIMClient.enumInstances(Unknown Source)
 at com.ibm.cimom.install.VerifyConfig.enumInstances(Unknown Source)
 at com.ibm.cimom.install.VerifyConfig.enumInstances(Unknown Source)
 at com.ibm.cimom.install.VerifyConfig.main(Unknown Source)
FAILED requesting IBMTSESS_StorageSystem instances
```

- Error Type 4. No ESS CIM Agent running or registered with SLP on current host

If the ESS CIM Agent is not started or it has not registered with SLP on the current host, the following message is displayed in the output messages in the Command Prompt window:

**Result:**

This completes the verification of the connection to the ESS.

---

## Removing the ESS CIM Agent for Windows

This optional task gives the instructions for removing the ESS CIM Agent from your Windows system.

**Steps:**

Perform the following steps to remove the ESS CIM Agent:

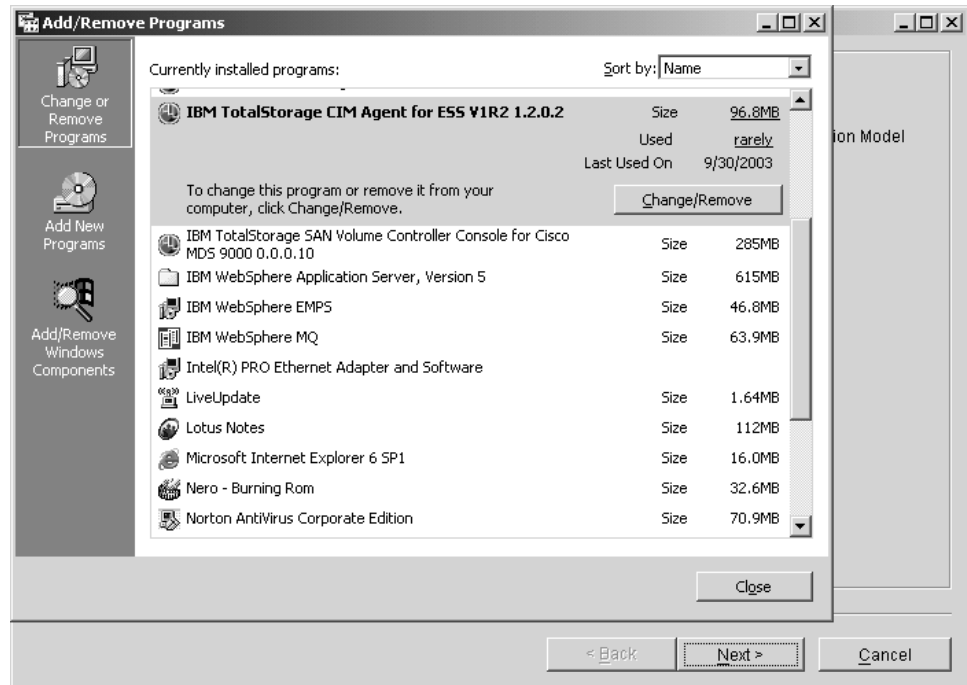
1. Log on to the system where the ESS CIM Agent is installed. Log on with a user name that is a local system administrator.
2. Stop the CIMOM and the SLP services if they are started.
  - a. Click **Start -> Settings -> Control Panel**. In the Control Panel window, double-click on the **Administrative Tools** icon and then double-click the **Services** icon. The Services window opens.
  - b. Stop the SLP service if it has already been installed by the ESS CIM Agent installer:
    - 1) In the Services window, scroll to **IBM CIM Object Manager - ESS**. Click on the service to select it.
    - 2) If the Status column shows Started, right-click the service, then click **Stop** on the menu.
  - c. Stop the SLP service:

**Note:** You must be careful if you have other applications that use SLP service. In this case, you must stop these applications before stopping SLP service, because during the removal process the SLP service will be deleted. You must also stop the configuration utilities for the ESS CIM Agent, if they are running.

- 1) In the Services window, scroll to **Service Location Protocol**. Click on this service to select it.
  - 2) If it is running (the Status column shows Started), right-click the service, then click **Stop** on the menu.

(If you did not stop the IBM CIM Object Manager service, the system now asks if you want to stop the IBM CIM Object Manager service. Because CIM Object Manager service is dependent on the Service Location Protocol service which you just stopped, you must click **YES** to stop the CIM Object Manager service.)
  - 3) Wait for the services to stop.
  - 4) Close the Services window.
  - 5) Close the Administrative Tools window.
3. Use the Windows Add/Remove Programs facility to remove the ESS CIM Agent and the Service Location Protocol components.
  - a. From the Windows menu bar, click **Start -> Settings -> Control Panel**. Double-click **Add/Remove Programs**.

- b. Click **IBM TotalStorage CIM Agent for ESS** from the list of currently installed programs and click **Remove** to remove the product.



4. The Welcome window for the Uninstaller opens. Click **Next** to continue or click **Cancel** to stop the removal of the ESS CIM Agent.



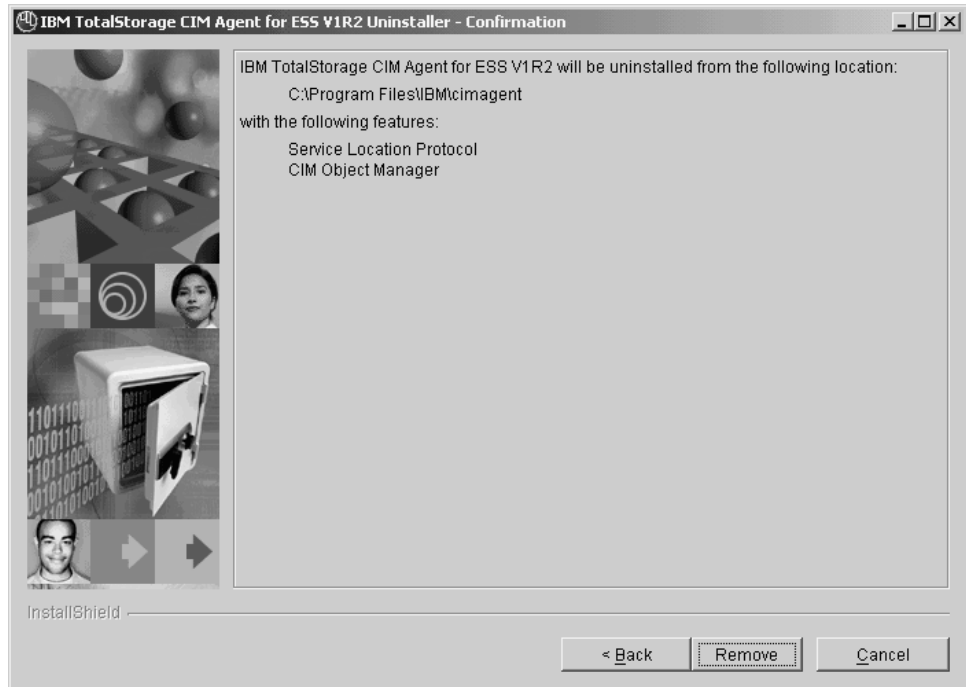
5. The program detects whether the SLP and the CIMOM services are running.
- You should consider at this point whether applications other than the ESS CIM Agent are dependent on the services.

- a. Click **Next** to have the program stop the services for you.
  - b. Click **Cancel** to exit the removal process if you wish to manually stop the services and any dependent applications, which is recommended. Instructions for stopping the services are described in step 2 on page 80. You must then restart the removal process from the Windows Add/Remove facility.
- If the SLP service is not started, the program continues with a Confirmation window for the Uninstaller. The Confirmation window displays the location from which the ESS CIM Agent and the SLP and CIMOM features 5916 will be removed.

**Note:** If the SLP service was installed by a CIM Agent other than the ESS CIM Agent, only the SLP files that were copied during the ESS CIM Agent installation are removed and the SLP windows service will not be uninstalled.



6. Click **Remove** to continue or click **Cancel** to stop the removal of the ESS CIM Agent. Click **Back** to return to the previous window.



7. The Uninstallation Progress window opens. Wait for the program to remove the ESS CIM Agent product.



8. The Finish window for the Uninstaller opens. This window indicates the result of the removal process (successful or failed). Click **Finish** to complete the removal process and exit the wizard.



If the program could not remove some information from the system, the Restart window opens. You will need to restart your system. At the restart, the previously locked files are released and automatically deleted.

9. Close the Add/Remove Programs window.
10. Restart the system (now or later) to complete the removal process.

#### Post-processing requirements:

Perform the following steps to complete the removal process:

1. If the system has not been restarted since ESS CIM Agent was removed, do so now.
2. Log on as a local administrator.
3. Remove other files and folders for ESS CIM Agent, as the removal process does not delete configuration files, logs, and similar files that were created during or after the installation process. The files are located in the destination path where you installed the ESS CIM Agent. An example of the default destination path is: C:\Program Files\IBM\cimagent. Remove the cimagent folder and all of its contents (especially if you plan to reinstall ESS CIM Agent).

**Note:** If you want to keep the old configuration files, save them in another location on your system to restore them later before removing them from the installation destination path.

4. Perform other cleanup tasks:
  - a. Close both the Services and the Add/Remove Program windows if you have not already done so.
  - b. Empty your Windows Recycle Bin to reclaim the disk space that was made available during the removal process.



---

## Chapter 5. CIM Agent installation and configuration commands

This chapter includes information about the commands that you use when you install and configure the CIM Agent on a server or workstation running Linux, UNIX, or Windows 2000 or later operating system. This chapter also presents a complete character syntax of the programs, commands, flags, and values that you can use for each command. There is also a section that shows examples of commands and the output that results from issuing the command.

---

### Overview of the CIM Agent commands and subcommands

This section briefly introduces the CIM Agent commands and provides general guidelines for using the commands.

Before you use the commands, refer to the appropriate chapter for your operating system for information about how to install or configure and enable the CIM Agent:

- AIX: Chapter 2, "CIM Agent on AIX," on page 7
- Linux: Chapter 3, "CIM Agent for Linux," on page 33
- Windows 2000 or later: Chapter 4, "ESS CIM Agent for Windows," on page 59

### Description of commands

You can use several commands on the CIM Agent command line interface to perform various tasks within the CIM Agent. Table 2 lists the commands that you can use with the CIM Agent.

*Table 2. Summary of CIM Agent commands*

| Command              | Type of command | Description                                                                                                                                        |
|----------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>modifyconfig</b>  | Configuration   | Updates the cimom.properties configuration file.                                                                                                   |
| <b>mkcertificate</b> | Utility         | Runs during installation to ensure that your security is not compromised.                                                                          |
| <b>setdevice</b>     | Configuration   | Updates the configuration of the managed devices                                                                                                   |
| <b>setuser</b>       | Configuration   | Updates the configuration for the users of the Enterprise Storage Server.                                                                          |
| <b>slpd</b>          | Utility         | Starts automatically during installation and registers itself with the SLP daemon and enables the client code to find the ESS CIM Agent service.   |
| <b>startcimom</b>    | Operational     | Starts the CIM Agent                                                                                                                               |
| <b>stopcimom</b>     | Operational     | Stops the CIM Agent                                                                                                                                |
| <b>verifyconfig</b>  | Utility         | Locates all WBEM services in the local network and displays them, then calls the CIMOMs on the local machine to request information about the ESS. |

## Invoking the CIM Agent

There are two ways to invoke the CIM Agent:

- Single command line invocation

You can invoke a command by including all the relevant subcommands, parameters and values on one command line.

- Interactive mode

You can invoke a program which opens an interactive session and displays the following command prompt >>> at the beginning of each line.

---

## Conventions used in this chapter

This section describes the notational conventions that are used in this chapter for the syntax diagrams.

### 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 CIM Agent commands. In doing so, it defines the symbols that represent the CIM Agent 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



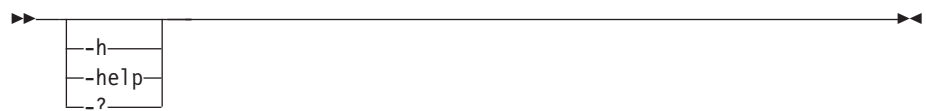
Represents the name of a command, flag, parameter, or argument. A keyword is not in italics. Spell a keyword exactly as it is shown in the syntax diagram.

#### Required keywords



Indicate the parameters or arguments you must specify for the command. Required keywords appear on the main path line. Required keywords that cannot be used together are stacked vertically.

#### Optional keywords



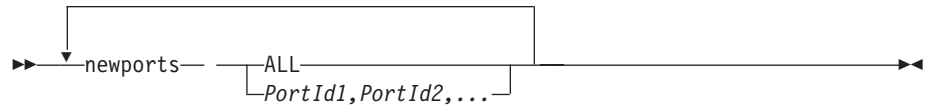
Indicate the parameters or arguments you can choose to specify for the command. Optional keywords appear below the main path line. Optional keywords that cannot be used together are stacked vertically.

### 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.

### parameter values



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.

### 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 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.

## Emphasis

The following typefaces are used to show emphasis:

|                  |                                                                                                                                                                                                                                    |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>boldface</b>  | Text in <b>boldface</b> represents menu items and command names.                                                                                                                                                                   |
| <i>italics</i>   | Text in <i>italics</i> is used to emphasize a word. In command syntax, it is used for variables for which you supply actual values.                                                                                                |
| <b>monospace</b> | Text in monospace identifies the data or command instances that you type, samples of command output, examples of program code or messages from the system, or names of command flags, parameters, arguments, and name-value pairs. |

## Anatomy of a command line

This section describes the parts of a command line string and also shows an example of a command line string

The command-line string, as discussed in this document, consists of the following parts:

|                        |                                                                                                                                        |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Command name</b>    | Name of the command, such as <b>setuser</b> , that the user invokes to use the command line interface                                  |
| <b>Subcommand name</b> | Name of the command that the user executes, such as <b>adduser</b> or <b>address</b> .                                                 |
| <b>Command options</b> | Options that modify the behavior of the command. Command options can be required or optional.                                          |
| <b>Flags</b>           | Command options marked with dash before the name, such as -create. Sometimes flags require extra parameters and sometimes they do not. |
| <b>Values</b>          | Command options that set the value of a flag.                                                                                          |
| <b>Arguments</b>       | Required target (object) of the command and are always the last items, not associated with an option, on the command line              |

This is an example of a command line string.

```
setuser -u userlogin -p loginpassword
```

---

## Configuration commands

The following sections describe the following CIM agent configuration commands that you can invoke in interactive mode:

- **setuser**
- **setdevice**
- **modifyconfig**

## Description of subcommands

You can use several subcommands on the CIM Agent configuration commands to perform various configuration tasks within the CIM Agent. Table 3 describes the subcommands that you can use with the CIM Agent configuration commands in interactive mode:

Table 3. Summary of CIM Agent *setuser* and *setdevice* subcommands

| Command             | Subcommands and description                                   |                                                                                                                         |
|---------------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>setuser</b>      | <b>adduser</b>                                                | Adds a user entry to the password file.                                                                                 |
|                     | <b>chuser</b>                                                 | Changes the user entry in the password file.                                                                            |
|                     | <b>lsuser</b>                                                 | Lists the users that currently exist in the password file.                                                              |
|                     | <b>rmuser</b>                                                 | Removes the user from the password file.                                                                                |
|                     | <b>setentry</b>                                               | Lists or sets the -create, -quiet, or -equiv options globally.                                                          |
|                     | <b>setoutput</b>                                              | Lists or sets the -hdr option globally.                                                                                 |
|                     | <b>exit</b>                                                   | Terminates the interactive session and exits from the application.                                                      |
|                     | <b>help or ?</b>                                              | Lists the available subcommands.                                                                                        |
| <b>setdevice</b>    | <b>address</b>                                                | Adds the specified ESS provider entry to the configuration file.                                                        |
|                     | <b>addressserver</b>                                          | Adds the specified ESS server entry to the configuration file.                                                          |
|                     | <b>chess</b>                                                  | Changes the specified ESS provider entry in the configuration file.                                                     |
|                     | <b>chessserver</b>                                            | Changes the specified ESS server entry in the configuration file.                                                       |
|                     | <b>lsess</b>                                                  | Lists the ESS provider entries that currently exist in the configuration file and meet the optional search criteria.    |
|                     | <b>lsessserver</b>                                            | Lists the ESS server entries that currently exist in the configuration file and that meet the optional search criteria. |
|                     | <b>rmess</b>                                                  | Removes the specified ESS provider entry from the configuration file.                                                   |
|                     | <b>rmessserver</b>                                            | Removes the specified ESS server entry from the configuration file.                                                     |
|                     | <b>setentry</b>                                               | Lists or sets the -create, -quiet, or -equiv options globally.                                                          |
|                     | <b>setoutput</b>                                              | Lists or sets the -hdr option globally.                                                                                 |
|                     | <b>exit</b>                                                   | Terminates the interactive session and exits from the application.                                                      |
|                     | <b>help or ?</b>                                              | Lists the available subcommands.                                                                                        |
| <b>modifyconfig</b> | There are no subcommands for the <b>modifyconfig</b> command. |                                                                                                                         |

## setuser

### Description

Use the **setuser** command in interactive mode to update the configuration file containing the user names and encrypted passwords for the users allowed to access the ESS CIM Agent CIMOM. You can list one or all users, add a user, change a user password, or remove a user.

You can use the following subcommands with the **setuser** command:

- **adduser**
- **chuser**
- **lsuser**
- **rmuser**
- **setentry**
- **setoutput**
- **exit**
- **help** or **?**

### Syntax

►—setuser— —-u *user*— —-p *password*—◄◄

This section describes the syntax for the options and values that you can use with the **setuser** subcommand.

### Parameters

**[-u]** Use -u with your username to log on to CIMOM and modify accounts.

**[-p]** Use -p with your password to log on to CIMOM and modify accounts.

### Examples

When you type the following subcommand, using the **setuser** command in interactive mode,

```
>>>adduser jsmith abcdef
```

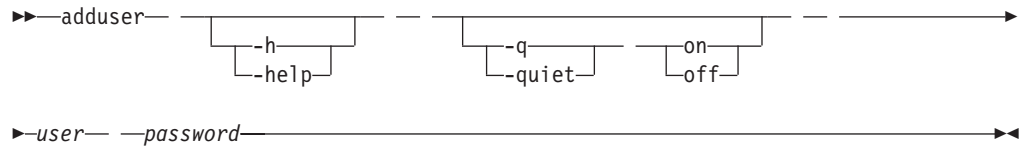
The following output displays on your screen:

An entry for user jsmith successfully added

## adduser

Use the **adduser** subcommand to add a user entry to the password file.

### Syntax



### Parameters

This section describes the syntax for the options and values you can use with the **adduser** subcommand.

#### **[-h | -help]**

Displays a help message.

#### **[-q[uiet] on | off]**

Use **-q** or **-quiet** to prevent the dialog for confirmation or parameter input if it is to replace an existing entry.

If you set the value to **on**, you do not get a prompt that requests that you confirm the parameter input.

If you set the value to **off**, you get a prompt that requests that you confirm the parameter input if it is to replace an existing entry.

### Examples

When you type the following subcommand, using the **setuser** command in interactive mode,

```
>>>adduser jsmith abcdef
```

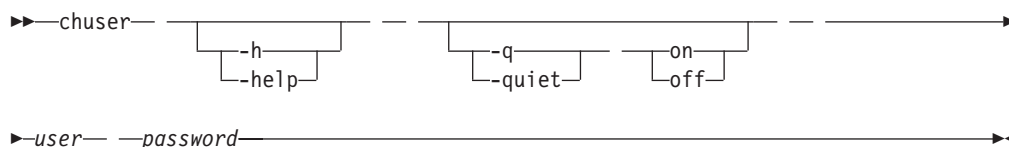
The following output displays on your screen:

```
An entry for user jsmith successfully added
```

## chuser

Use the **chuser** subcommand to change the user entry in the password file.

### Syntax



### Parameters

This section describes the syntax for the options and values you can use with the **chuser** subcommand.

#### [-h | -help]

Displays a help message.

#### [-q[uiet] on | off]

Use -q or -quiet to prevent the dialog for confirmation or parameter input.

If you set the value to on, you do not get a prompt that requests that you confirm the parameter input.

If you set the value to off, you get a prompt that requests that you confirm the parameter input before the subcommand executes effectively.

### Examples

When you type the following subcommand using the **setuser** command in interactive mode:

```
>>>chuser jsmith xyztuv
```

The following output displays on your screen:

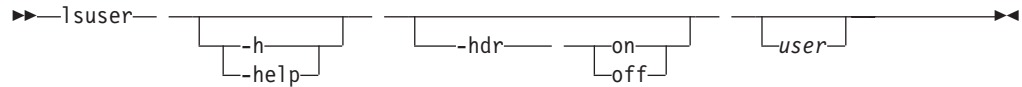
```
The entry for user jsmith successfully changed
```



# lsuser

Use the **lsuser** subcommand to list the users that currently exist in the password file.

## Syntax



## Parameters

This section describes the syntax for the options and values you can use with the **lsuser** subcommand.

### [-h | -help]

Displays a help message.

### [-hdr on | off]

Use -hdr to specify whether or not the **lsuser** subcommand displays the header line.

If you set the value to on, the **lsuser** subcommand displays a header line before the lines containing information about the users.

If you set the value to off, the **lsuser** subcommand does not display the header line.

## Examples

When you type the following subcommand using the **setuser** command in interactive mode:

```
>>>lsuser -hdr on
```

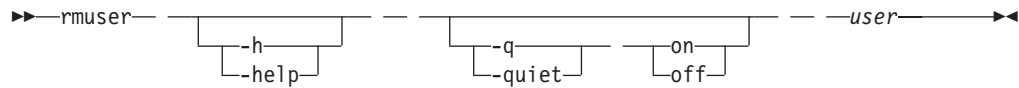
The following output displays on your screen:

```
USER : ENCRYPTED PASSWORD
jsmith : PyyvPJ11/VTa+1TD
ljohnson : gKguQMSQjpnKEi13
bcollins : Uj15YZ6uNg==
```

## rmuser

Use the **rmuser** subcommand to remove the user from the password file.

### Syntax



### Parameters

This section describes the syntax for the options and values you can use with the **rmuser** subcommand.

#### [-h | -help]

Displays a help message.

#### [-q[uiet] on | off]

Use -q or -quiet to prevent the dialog for confirmation or parameter input.

If you set the value to on, you do not get a prompt that requests that you confirm the parameter input.

If you set the value to off, you get a prompt that requests that you confirm the parameter input before the command executes effectively.

### Examples

When you type the following subcommand using the **setuser** command in interactive mode:

```
>>>rmuser jsmith
```

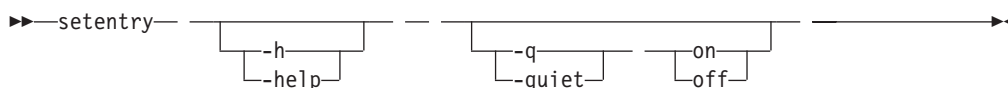
The following output displays on your screen:

```
User jsmith successfully removed
```

## setentry

Use the **setentry** subcommand to list or set the -quiet option globally.

### Syntax



### Parameters

This section describes the syntax for the options and values you can use with the **setentry** command.

#### [-h | -help]

Displays a help message.

#### [-q[uiet] on | off]

Use -quiet in interactive mode to set the -quiet option to on or off for the subsequent commands in the interactive session. It applies as a default to the subsequent **adduser**, **chuser** or **rmuser** subcommands, except for the subcommands that explicitly specify the -quiet option.

#### Notes:

1. When the **setuser** command starts, the -quiet option is set to either the value that is specified as command options (if present in the command line) or to the following initial default value: -quiet on.
2. The **setentry** subcommand without any argument displays the current state of the options -quiet.

### Examples

When you type the following subcommand and parameters using the **setuser** command in interactive mode:

```
>>>setentry
```

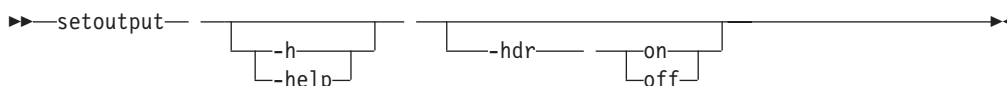
The following output displays on your screen:

```
quiet=on
```

## setoutput

Use the **setoutput** command to list or set the -hdr option globally

### Syntax



### Parameters

This section describes the syntax for the options and values you can use with the **setoutput** command.

#### [-h | -help]

Displays a help message.

#### [-hdr on | off]

Use -hdr in interactive mode to set the -hdr option to on or off for the subsequent commands in the interactive session. It applies as a default to the subsequent **lsuser** commands, except for the commands that explicitly specify the -hdr option.

#### Notes:

1. When the **setuser** command starts, the -hdr option is set to the value specified as command option (if present in the command line) or to the following initial default value: -hdr on.
2. The **setentry** subcommand without any argument displays the current state of the option -hdr.

### Examples

When you type the following subcommand and parameters using the **setuser** command in interactive mode:

```
>>>setoutput
```

The following output displays on your screen:

```
hdr=on
```

## setdevice

### Description

Use the **setdevice** command to update the configuration of managed devices. You can also use the **setdevice** command to define the ESS that is managed by the ESS CIM Agent. You must have a username, password, and valid internet protocol address of an ESS to access the ESS CIM Agent.

There are two ways to invoke the **setdevice** command:

- Single command line invocation  
You can invoke a command by including all the relevant subcommands, parameters and values on one command line.
- Interactive mode  
You can invoke a program which opens an interactive session and displays the following command prompt >>> at the beginning of each line.

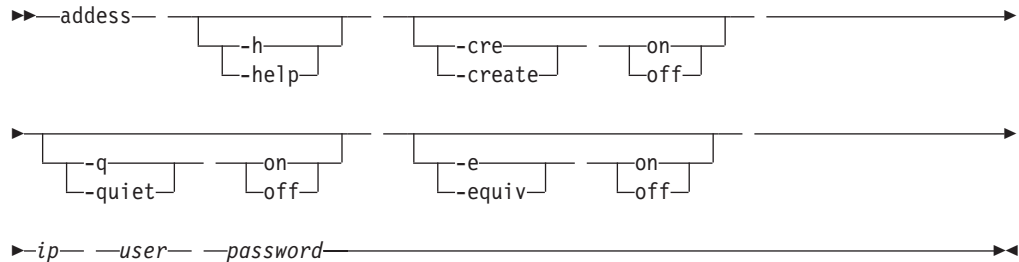
You can use the following commands with the **setdevice** command:

- **address**
- **addressserver**
- **chess**
- **chessserver**
- **lssess**
- **lssessserver**
- **rmess**
- **rmessserver**
- **setentry**
- **setoutput**
- **exit**
- **help** or **?**

## address

Use the **address** subcommand to add the specified ESS provider entry to the configuration file.

### Syntax



### Parameters

This section describes the syntax for the options and values you can use with the **address** subcommand.

#### **[-h | -help]**

Use -h or -help to display the help for the **adduser** subcommand.

#### **[-cre[ate] on | off]**

Use -cre or -create to create the configuration file if it does not already exist.

If you set the value to on, the command automatically creates the configuration file if it does not already exist.

If you set the value to off and the configuration file does not already exist, you get an error message and the operation stops.

#### **[-e[quiv] on | off]**

Use -e or -equiv to specify whether or not the **address** and **chess** subcommands are equivalent.

If you set the value to on, the **address** and **chess** subcommands are equivalent. The commands create an entry if an entry with the same key does not exist. Or, the command updates the existing entry if an entry with the same key already exists.

If you set the value to off, **address** and **chess** are not considered equivalent. You get an error message when you use **address** if an entry with the same key already exists. Or, you get an error message when you use **chess** if an entry with the same key does not exist.

#### **[-q[uiet] on | off]**

Use -q or -quiet to prevent the dialog for confirmation or parameter input.

If you set the value to on, you do not get a prompt that requests that you confirm the parameter input.

If you set the value to off, you get a prompt that requests that you confirm the parameter input if it is to replace an existing entry (assuming -equiv on).

## Examples

When you type the following subcommand and parameters using the **setdevice** command in interactive mode,

```
>>>address 1.2.3.4 msmith abcdef
```

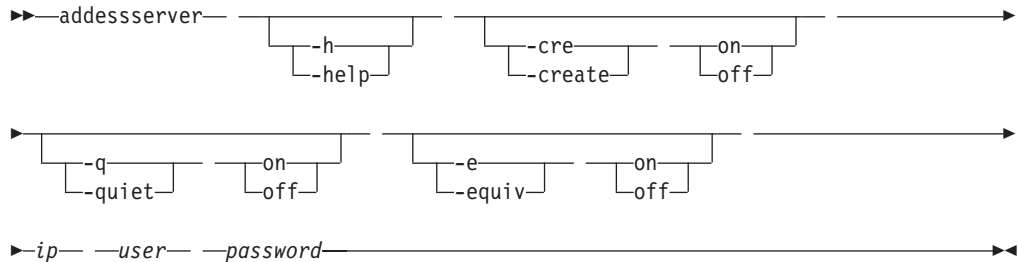
The following output displays on your screen:

```
An ess provider entry for IP 1.2.3.4 successfully added
```

## addessserver

Use the **addessserver** subcommand to add the specified ESS server entry to the configuration file.

### Syntax



### Parameters

This section describes the syntax for the options and values you can use with the **addessserver** subcommand.

#### [-h | -help]

Use -h or -help to display the help for the **adduserserver** subcommand.

#### [-cre[ate] on | off]

Use -cre or -create to create the configuration file if it does not already exist.

If you set the value to on, the command automatically creates the configuration file if it does not already exist.

If you set the value to off and the configuration file does not already exist, you get an error message and the operation stops.

#### [-e[quiv] on | off]

Use -e or -equiv to specify whether or not the **addessserver** and **chess** subcommands are equivalent.

If you set the value to on, the **addessserver** and **chess** subcommands are equivalent. The commands create an entry if an entry with the same key does not exist. Or, the command updates the existing entry if an entry with the same key already exists.

If you set the value to off, **addessserver** and **chess** are not considered equivalent. You get an error message when you use **addessserver** if an entry with the same key already exists. Or, you get an error message when you use **chess** if an entry with the same key does not exist.

#### [-q[uiet] on | off]

Use -q or -quiet to prevent the dialog for confirmation or parameter input.

If you set the value to on, you do not get a prompt that requests that you confirm the parameter input.

If you set the value to off, you get a prompt that requests that you confirm the parameter input if it is to replace an existing entry (assuming -equiv on).



## Examples

When you type the following subcommand and parameters using the **setdevice** command in interactive mode,

```
>>>addressserver 1.2.3.4 msmith abcdef
```

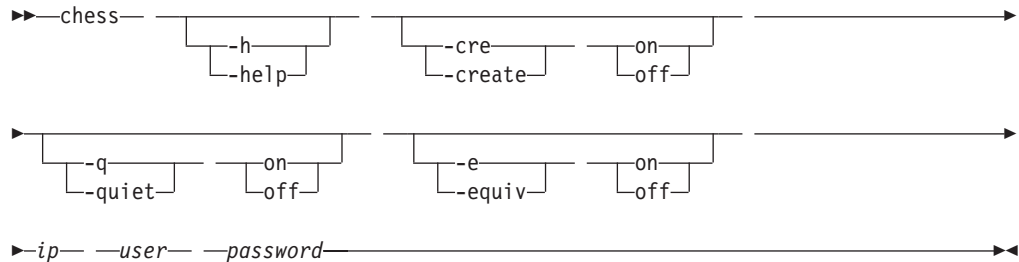
The following output displays on your screen:

An ess copy services provider entry for IP 1.2.3.4 successfully added

## chess

Use the **chess** subcommand to change the specified ESS provider entry in the configuration file.

### Syntax



### Parameters

This section describes the syntax for the options and values you can use with the **chess** subcommand.

#### **[-h | -help]**

Use -h or -help to display the help for the **chess** subcommand.

#### **[-cre[ate] on | off]**

Use -cre or -create to create the configuration file if it does not already exist.

If you set the value to on, the command automatically creates the configuration file if it does not already exist.

If you set the value to off and the configuration file does not already exist, you get an error message and the operation stops.

#### **[-e[quiv] on | off]**

Use -e or -equiv to specify whether or not the **address** and **chess** subcommands are equivalent.

If you set the value to on, the **address** and **chess** subcommands are equivalent. The commands create an entry if an entry with the same key does not exist. Or the command updates the existing entry if an entry with the same key already exists.

If you set the value to off, **address** and **chess** are not considered equivalent. You get an error message when you use **address** if an entry with the same key already exists. Or, you get an error message when you use **chess** if an entry with the same key does not exist.

#### **[-q[uiet] on | off]**

Use -q or -quiet to prevent the dialog for confirmation or parameter input.

If you set the value to on, you do not get a prompt that requests that you confirm the parameter input.

If you set the value to off, you get a prompt that requests that you confirm the parameter input before the command executes successfully.

## Examples

When you type the following subcommand and parameters using the **setdevice** command in interactive mode:

```
>>>chess 1.2.3.4 ljohnson xyztuv
```

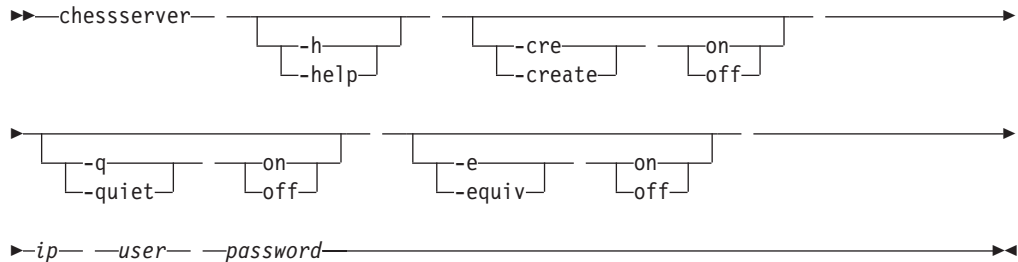
The following output displays on your screen:

The ess provider entry for IP 1.2.3.4 successfully changed

## chessserver

Use the **chessserver** subcommand to change the specified ESS Copy Services server entry in the configuration file.

### Syntax



### Parameters

This section describes the syntax for the options and values that you can use with the **chessserver** subcommand.

#### [-h | -help]

Use -h or -help to display the help for the **chessserver** subcommand.

#### [-cre[ate] on | off]

Use -cre or -create to create the configuration file if it does not already exist.

If you set the value to on, the command automatically creates the configuration file if it does not already exist.

If you set the value to off and the configuration file does not already exist, you get an error message and the operation stops.

#### [-e[quiv] on | off]

Use -e or -equiv to specify whether or not the **addessserver** and **chessserver** subcommands are equivalent.

If you set the value to on, the **addessserver** and **chessserver** subcommands are equivalent. The commands create an entry if an entry with the same key does not exist. Or, the command updates the existing entry if an entry with the same key already exists.

If you set the value to off, **addessserver** and **chessserver** are not considered equivalent. You get an error message when you use **addessserver** if an entry with the same key already exists. Or, you get an error message when you use **chessserver** if an entry with the same key does not exist.

#### [-q[uiet] on | off]

Use -q or -quiet to prevent the dialog for confirmation or parameter input.

If you set the value to on, you do not get a prompt that requests that you confirm the parameter input.

If you set the value to off, you get a prompt that requests that you confirm the parameter input before the command executes successfully.

## Examples

When you type the following subcommand and parameters using the **setdevice** command in interactive mode:

```
>>>chessserver 1.2.3.4 ljohnson xyztuv
```

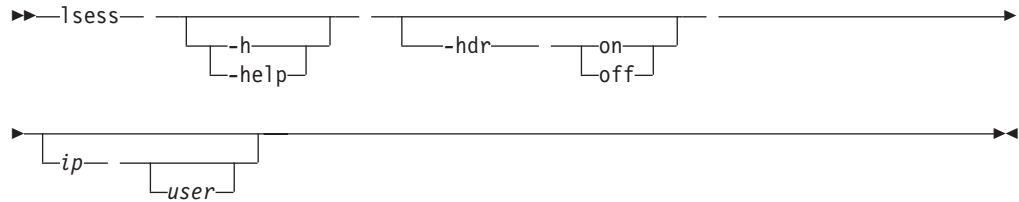
The following output displays on your screen:

The ess provider entry for IP 1.2.3.4 successfully changed

## lsess

Use the **lsess** subcommand to list the ESS provider entries that currently exist in the configuration file and meet the optional search criteria.

### Syntax



### Parameters

This section describes the syntax for the options and values you can use with the **lsess** subcommand.

#### [-h | -help]

Use -h or -help to display the help for the **lsess** subcommand.

#### [-hdr] on | off]

Use -hdr to control the display of the header line when using the **lsess** subcommand.

If you set the value to on, the **lsess** subcommand displays a header line before the lines containing information about the ESS entries.

If you set the value to off, the **lsess** subcommand does not display the header line before the lines containing information about the ESS entries.

### Examples

When you type the following subcommand and parameters using **setdevice** command in interactive mode:

```
>>>lsess -hdr off 1.2.3.4
```

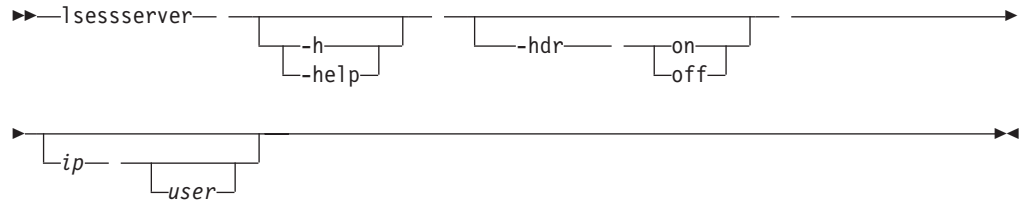
The following output displays on your screen:

```
1.2.3.4:1johnson:o18xP0gGhB0=
```

## lsessserver

Use the **lsessserver** subcommand to list the ESS server entries that currently exist in the configuration file and that meet the optional search criteria.

### Syntax



### Parameters

This section describes the syntax for the options and values you can use with the **lsess** subcommand.

#### [-h | -help]

Use -h or -help to display the help for the **lsessserver** subcommand.

#### [-hdr] on | off]

Use -hdr to control the display of the header line when using the **lsessserver** subcommand.

If you set the value to on, the **lsessserver** subcommand displays a header line before the lines that contain information about the ESS Copy Services entries.

If you set the value to off, the **lsessserver** subcommand does not display the header line before the lines that contain information about the ESS Copy Services entries.

### Examples

When you type the following subcommand and parameters using **setdevice** command in interactive mode:

```
>>>lsessserver -hdr off 1.2.3.4
```

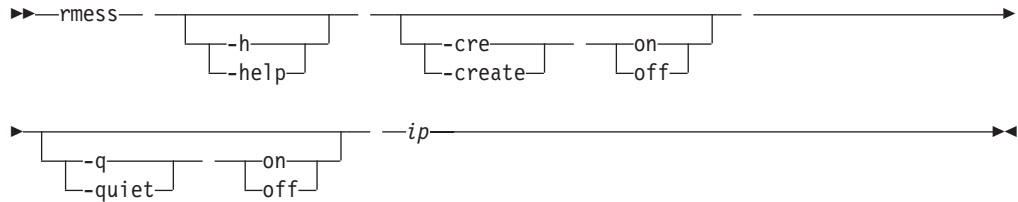
The following output displays on your screen:

```
1.2.3.4:1johnson:o18xP0gGhB0=
```

## rmess

Use the **rmess** subcommand to remove the specified ESS provider entry from the configuration file.

### Syntax



### Parameters

This section describes the syntax for the options and values you can use with the **rmess** subcommand.

#### [-h | -help]

Use -h or -help to display the help for the **rmess** subcommand.

#### [-cre[ate] on | off]

Use -cre or -create to create the configuration file if it does not already exist.

If you set the value to on, the command automatically creates the configuration file if it does not already exist.

If you set the value to off and the configuration file does not already exist, you get an error message and the operation stops.

#### [-q[uiet] on | off]

Use -q or -quiet to prevent the dialog for confirmation or parameter input.

If you set the value to on, you do not get a prompt that requests that you confirm the parameter input.

If you set the value to off, you get a prompt that requests that you confirm the parameter input before the command executes effectively.

### Examples

When you type the following subcommand and parameters using the **setdevice** command in interactive mode:

```
>>>rmess -q on 1.2.3.4
```

The following output displays on your screen:

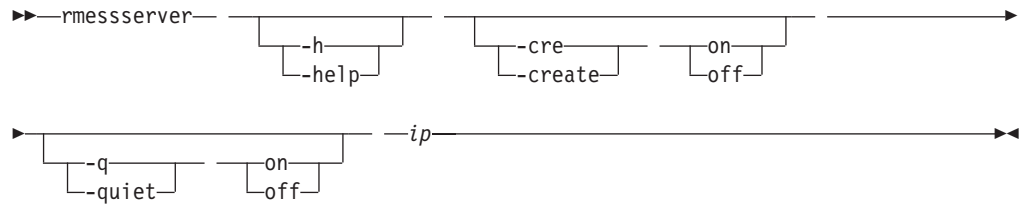
```
The ess provider entry for IP 1.2.3.4 successfully removed
```



## rmessserver

Use the **rmessserver** subcommand to remove the specified ESS Copy Services server entry from the configuration file.

### Syntax



### Parameters

This section describes the syntax for the options and values you can use with the **rmessserver** subcommand.

#### [-h | -help]

Use -h or -help to display the help for the **rmessserver** subcommand.

#### [-cre[ate] on | off]

Use -cre or -create to create the configuration file if it does not already exist.

If you set the value to on, the command automatically creates the configuration file if it does not already exist.

If you set the value to off and the configuration file does not already exist, you get an error message and the operation stops.

#### [-q[uiet] on | off]

Use -q or -quiet to prevent the dialog for confirmation or parameter input.

If you set the value to on, you do not get a prompt that requests that you confirm the parameter input.

If you set the value to off, you get a prompt that requests that you confirm the parameter input before the command executes effectively.

### Examples

When you type the following subcommand and parameters using the **setdevice** command in interactive mode:

```
>>>rmessserver -q on 1.2.3.4
```

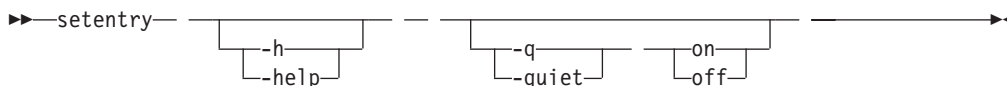
The following output displays on your screen:

The ess provider entry for IP 1.2.3.4 successfully removed

## setentry

Use the **setentry** subcommand to list or set the -quiet option globally.

### Syntax



### Parameters

This section describes the syntax for the options and values you can use with the **setentry** subcommand.

#### [-h | -help]

Displays a help message.

#### [-q[uiet] on | off]

Use -quiet in interactive mode to set the -quiet option to on or off for the subsequent subcommands in the interactive session. It applies as a default to the subsequent **address**, **chess** or **rmess** subcommands, except for the subcommands that explicitly specify the -quiet option.

#### Notes:

1. When the **setdevice** command starts, the -quiet option is set to the values that are specified as command options (if present in the command line) or to the initial default value of -quiet on.
2. The **setentry** subcommand without any argument displays the current state of the -quiet option.

### Examples

When you type the following subcommand and parameters using the **setdevice** command in interactive mode,

```
>>>setentry
```

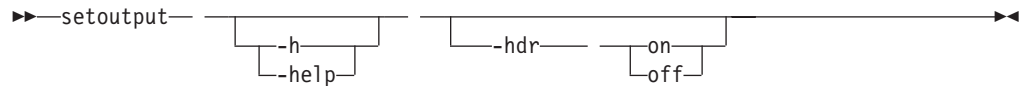
The following output displays on your screen:

```
quiet=on
```

## setoutput

Use the **setoutput** subcommand to list or set the -hdr option globally

### Syntax



### Parameters

This section describes the syntax for the options and values you can use with the **setoutput** subcommand.

#### [-h | -help]

Displays a help message.

#### [-hdr on | off]

Use -hdr in interactive mode to set the -hdr option to on or off for the subsequent subcommands in the interactive session. It applies as a default to the subsequent **lsuser** subcommands, except for the subcommands that explicitly specify the -hdr option.

#### Notes:

1. When the **setdevice** command starts, the -hdr option is set to the value specified as command option (if present in the command line), or to the initial default value: -hdr on.
2. The **setentry** subcommand without any argument displays the current state of the option -hdr.

### Examples

When you type the following subcommand and parameters using the **setdevice** command in interactive mode,

```
>>>setoutput
```

The following output displays on your screen:

```
hdr=on
```

---

## Operational commands

This section describes the following CIM Agent operational commands:

- **startcimom**
- **stopcimom**

## startcimom

Use the **startcimom** command to start the CIM Agent.

### Syntax

▶▶—startcimom—▶▶

### Description

Use the **startcimom** command to run the CIM Agent code. When you use the **startcimom** command, it registers itself with SLP and accepts requests on the port specified in the cimom.properties file (by default 5989).

This command starts the ESS CIM Agent when the ESS CIM Agent is installed. Generally it is installed as a service or part of the system **inittab**. In most cases, there is no reason to start the ESS CIM Agent manually; however, this command will start the ESS CIM Agent, if needed.

The certificate used by the ESS CIM Agent must also be made available to each client software product that intends to communicate with the ESS CIM Agent.

## stopcimom

Use the **stopcimom** command to stop the CIM Agent.

### Syntax

▶▶—stopcimom—▶▶

### Parameters

There are no options for the **stopcimom** command.

### Description

Use the **stopcimom** command to stop the ESS CIM Agent.

### Related topics

- See “startcimom” on page 113 for the **startcimom** command.

---

## Utility commands

The following sections describe the following CIM Agent utility commands:

- **mkcertificate**
- **slpd**
- **verifyconfig**

## mkcertificate

Use the **mkcertificate** command to check the level of security on your host.

### Syntax

►►—mkcertificate—◄◄

### Description

The **mkcertificate** runs at install time and can be rerun whenever the user feels that security might be compromised. The **mkcertificate** command creates an X.509 certificate and places it in a certificate store called truststore. The certificate is required by client code that communicates with the ESS CIM Agent using SSL secure communication. If you have installed a product that uses this type of communication with the ESS CIM Agent, you must be sure that the certificate that is created with the **mkcertificate** command is available to all clients and software products that communicate with the ESS CIM Agent.



## slpd

Use the **slpd** command to enable the client code to find the ESS CIM Agent service.

### Syntax

►►—slpd—◄◄

### Description

The SLP daemon starts automatically by the installation program or at the system reboot, but you can also start it manually if it is not already running. The ESS Agent registers itself with the SLP daemon to enable client code to find the ESS CIM Agent service. You should always keep the SLP daemon running.

The Service Agents (SA) communicate with each other on one subnet of an IP network to find each other's services. If you install products that use the ESS CIM Agent but the products run on multiple subnets, consider designating one of your SLP daemons to act as a Directory Agent (DA). To do this, change the configuration that is used by each SLP daemon (slpd.conf) to point to the IP address of the SLP daemon that is to act as the DA. To do this, change the *isDA* configuration variable so that the slpd.conf is true. See the documentation for Open SLP at <http://www.openslp.org/Documentation>.

## verifyconfig

Use the **verifyconfig** command to locate all WBEM services (for example, CIMOMs) in the local network.

### Syntax



### Parameters

This section describes the syntax for the options and values you can use with the **verifyconfig** command.

- b** Gets basic authentication if authentication is disabled.
- u** The username used to log into CIMOM.
- p** The password for the username.

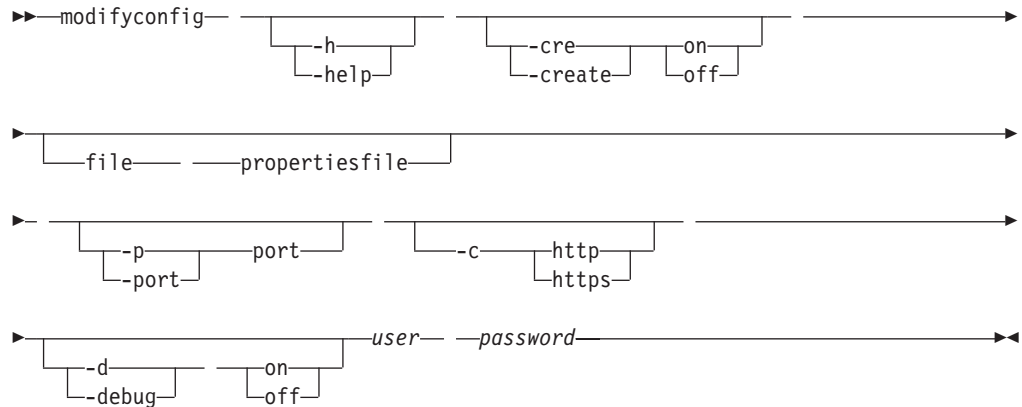
### Description

The **verifyconfig** command is used to locate all WBEM services (for example, CIMOMs) in the local network, display them and then call the CIMOMs on the local machine only requesting information about whether the CIMOMs know of any ESS. Locates all WBEM services in the network. These may include ESS CIM Agents or CIM Agents of other hardware devices. It then communicates with the WBEM service (that is, CIMOM) running on the local machine, if it is found, and attempts to retrieve some basic instance information from the CIMOM running there.

## modifyconfig

Use the **modifyconfig** subcommand to modify cimom.properties file properties.

### Syntax



### Parameters

This section describes the syntax for the options and values you can use with the **modifyconfig** command.

#### [-h | -help]

Displays a help message.

#### [-cre[ate] on | off]

If you set the value to on, the command automatically creates the properties file if it does not already exist.

If you set the value to off and the properties file does not already exist, you get an error message and the operation stops.

#### [-file propertiesfile]

Use -file flag to specify the properties file, if you want to use a file other than the default (cimom.properties) file, that must be used by this command.

#### [-p[ort] port]

Use the -p flag to update the port property value. The port parameter specifies the value of the port property.

#### [-c http|https]

Use the -c flag to update the communication protocol value. The possible values are http or https.

#### [-d[ebug] on|off]

Use -d or -debug to specify the debug mode. If you set the value to on, the debug is enabled. If you set the value to off, the debug is disabled.

### Examples

When you type the following subcommand, using the **modifyconfig** command in interactive mode:

```
modifyconfig -p 5989 -d on
```

The following output displays on your screen:

```
Port (set to 5989) and Debug (set to On)
```



---

## Appendix A. ESS API component definitions

This section describes the elements, the namespace, and the object name for the ESS API.

### Elements:

The ESS API consists of the following elements: schemas, classes, properties, methods, indications, associations, references and qualifiers. The following list describes each type of element:

|                    |                                                                                                                                                                              |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Schema</b>      | A group of classes defined to a single namespace. Within the CIM Agent, the schemas that are supported are the ones loaded through the managed object format (MOF) compiler. |
| <b>Class</b>       | The definition of an object within some hierarchy. Classes can have methods and properties and be the target of an association.                                              |
| <b>Property</b>    | A value used to characterize instances of a class.                                                                                                                           |
| <b>Method</b>      | An implementation of a function on a class.                                                                                                                                  |
| <b>Indication</b>  | An object representation of an event.                                                                                                                                        |
| <b>Association</b> | A class that contains two references which define a relationship between two objects.                                                                                        |
| <b>Reference</b>   | The role that an object plays in an association.                                                                                                                             |
| <b>Qualifier</b>   | Additional information about other elements, classes, associations, indications, methods, method parameters, instances, properties, or references.                           |

**Namespace:** A namespace defines the scope over which an ESS API schema applies. The only namespace supported by the CIM Agent is **root/cimv2**. An ESS API schema or version is loaded into a namespace when that schema is compiled by the Managed Object Format compiler. ESS API operations always execute within the context of a namespace. The namespace must be specified within the message that the client sends to the CIM Agent.

Clients cannot create new namespaces. Attempts to do so result in errors.

**Object name:** An object name consists of a namespace path and a model path. The namespace path provides access to the ESS API implementation managed by the CIM Agent. The model path provides navigation within the implementation. An example of an object name is:

`http://cimom.storage.sanjose.ibm.com/root/cimv2:CIMDisk.key1=value1, key2=value2`

where `http://cimom.storage.sanjose.ibm.com/root/CIMV2` is the namespace path and the rest is the model path.

### Related topics:

- “CIM Agent communication concepts” on page 123
- “CIM Agent Communication methods” on page 124
- “Error codes returned by the CIMOM” on page 135
- “ESS API class definitions” on page 145
- “ESS class definition schemas” on page 214



---

## Appendix B. CIM Agent communication with the ESS API

This section describes communication between the ESS CIM Agent and ESS API. It includes the following information:

- CIM Agent communication concepts
- CIM Agent communication methods
- CIM Agent functional groups
- Error codes returned by the CIMOM

---

### CIM Agent communication concepts

This section describes the concepts involved in communication between the ESS CIM Agent and the client application.

#### Client communication:

A client application communicates with the CIM Agent through operation request messages encoded within XML. The CIM Agent returns responses with operation response messages. Requests and responses are sub-elements of the CIM <MESSAGE> element.

A <MESSAGE> sent to the CIM Agent must contain an ID attribute. A response from the CIM Agent returns this value and thereby enables the client to track requests and their responses.

The CIM Agent supports simple requests and simple responses. Simple requests are operation request messages that contain the <SIMPLEREQ> XML tag. Simple responses are operation response messages that contain the <SIMPLERSP> tag. A client application determines that the CIM Agent only supports simple operation requests and responses by examining the results of running the OPTIONS method.

#### Intrinsic and Extrinsic Methods:

All operations on the CIM Agent are performed by running one or more methods. A method is either an intrinsic method or an extrinsic method. Intrinsic methods are supported by the CIM Agent itself. These methods are included within XML <IMETHODCALL> tags sent in messages to the CIM Agent. Extrinsic methods are defined by the schema supported by the CIM Agent. These methods are included within XML <METHODCALL> tags sent in messages to the CIM Agent.

Client applications can call on the CIM Agent using the methods described in “CIM Agent Communication methods” on page 124. These methods fall within certain functional groups that might or might not actually be supported by the CIM Agent.

#### Related topics:

- Appendix A, “ESS API component definitions,” on page 121
- “CIM Agent Communication methods” on page 124
- “Error codes returned by the CIMOM” on page 135
- “ESS API class definitions” on page 145
- “ESS class definition schemas” on page 214

---

## CIM Agent Communication methods

The following sections and tables list the CIM intrinsic and extrinsic communication methods along with their parameters. Client application calls to these intrinsic methods result in CIM Agent calls to the device provider, if the device provider surfaces the classes or instances that are referenced in those calls.

The CIM Agent returns <IMETHODRESPONSE> or <METHODRESPONSE> elements to the client application when the intrinsic or extrinsic methods are executed. These elements are contained within a <MESSAGERESPONSE> tag.

### GetClass:

Table 4 defines the properties of the GetClass method, which is used to return a single class from the target namespace.

Table 4. GetClass method parameters

| Parameter          | Type    | Description                                                                                                            |
|--------------------|---------|------------------------------------------------------------------------------------------------------------------------|
| ClassName          | String  | Defines the name of the class to retrieve.                                                                             |
| LocalOnly          | Boolean | TRUE returns all properties, methods, and qualifiers overridden within the definition of the class.                    |
| IncludeQualifiers  | Boolean | TRUE returns all qualifiers for the class, its properties, methods, or method parameters. FALSE returns no qualifiers. |
| IncludeClassOrigin | Boolean | TRUE returns the CLASSORIGIN attribute of the class.                                                                   |

**Return values:** Either a single class or one of the following error codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE
- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_FAILED

See Table 23 on page 135 for an explanation of the error codes.

### GetInstance:

Table 5 defines the properties of the GetInstance method, which is used to return a single instance from the target namespace.

Table 5. GetInstance method parameters

| Parameter          | Type    | Description                                                                                                            |
|--------------------|---------|------------------------------------------------------------------------------------------------------------------------|
| InstanceName       | String  | Defines the name of the instance to retrieve.                                                                          |
| LocalOnly          | Boolean | TRUE returns all properties and qualifiers overridden within the definition of the class.                              |
| IncludeQualifiers  | Boolean | TRUE returns all qualifiers for the class, its properties, methods, or method parameters. FALSE returns no qualifiers. |
| IncludeClassOrigin | Boolean | TRUE returns the CLASSORIGIN attribute of the class.                                                                   |

**Return values:** Either a single class or one of the following error codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE



- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_INVALID\_CLASS
- CIM\_ERR\_NOT\_FOUND
- CIM\_ERR\_FAILED

#### **DeleteClass:**

The DeleteClass method is used to delete a single class from the target namespace.

**Note:** This operation is not supported. The CIM\_ERR\_NOT\_SUPPORTED error code is returned to the client application if a request to execute this operation is received.

#### **DeleteInstance:**

Table 6 defines the properties of the DeleteInstance method, which is used to delete a single instance from the target namespace.

*Table 6. DeleteInstance method parameters*

| Parameter    | Type   | Description                                 |
|--------------|--------|---------------------------------------------|
| InstanceName | String | Defines the name of the instance to delete. |

**Return values:** The named instance is deleted or one of the following error codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE
- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_INVALID\_CLASS
- CIM\_ERR\_NOT\_FOUND
- CIM\_ERR\_FAILED

See Table 23 on page 135 for an explanation of the error codes.

#### **CreateClass:**

The CreateClass method is used to create a new class from the target namespace.

**Note:** This operation is not supported. The CIM\_ERR\_NOT\_SUPPORTED error code is returned to the client application if a request to execute this operation is received.

#### **CreateInstance:**

Table 7 defines the properties of the CreateInstance method, which is used to create an instance in the target namespace. The instance must not already exist.

*Table 7. CreateInstance method parameters*

| Parameter | Type   | Description                                                                                                |
|-----------|--------|------------------------------------------------------------------------------------------------------------|
| Instance  | Object | The instance to be created. The instance must be based on a class already defined in the target namespace. |

**Return values:** If successful, the specified instance is created. Otherwise, one of the following error codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE
- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_INVALID\_CLASS
- CIM\_ERR\_ALREADY\_EXISTS
- CIM\_ERR\_FAILED

See Table 23 on page 135 for an explanation of the error codes.

#### **ModifyClass:**

The ModifyClass method is used to modify an existing class.

**Note:** This operation is not supported. The CIM\_ERR\_NOT\_SUPPORTED error code is returned to the client application if a request to execute this operation is received.

#### **ModifyInstance:**

Table 8 defines the properties of the ModifyInstance method, which is used to modify an existing instance in the target namespace. The instance must already exist.

*Table 8. ModifyInstance method parameters*

| Parameter | Type   | Description                    |
|-----------|--------|--------------------------------|
| Instance  | Object | Defines the modified instance. |

**Return values:** If successful, the specified instance is updated. Otherwise, one of the following error codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE
- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_INVALID\_CLASS
- CIM\_ERR\_NOT\_FOUND
- CIM\_ERR\_FAILED

See Table 23 on page 135 for an explanation of the error codes.

#### **EnumerateClasses:**

Table 9 defines the properties of the EnumerateClasses method, which is used to return a single class from the target namespace.

*Table 9. EnumerateClasses method parameters*

| Parameter       | Type    | Description                                                                                                                                              |
|-----------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| ClassName       | String  | Defines the name of the class for which subclasses are to be returned. If this field is NULL, all base classes within the target namespace are returned. |
| DeepInheritance | Boolean | TRUE returns all subclasses of the specified class. FALSE returns only immediate child subclasses.                                                       |

Table 9. EnumerateClasses method parameters (continued)

| Parameter          | Type    | Description                                                                                                            |
|--------------------|---------|------------------------------------------------------------------------------------------------------------------------|
| LocalOnly          | Boolean | TRUE returns all properties, methods, and qualifiers, that are overridden within the definition of the class.          |
| IncludeQualifiers  | Boolean | TRUE returns all qualifiers for the class, its properties, methods, or method parameters. FALSE returns no qualifiers. |
| IncludeClassOrigin | Boolean | TRUE returns the CLASSORIGIN of the class.                                                                             |

**Return values:** If successful, zero or more classes (CIMClass) are returned. Otherwise, one of the following error codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE
- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_INVALID\_CLASS
- CIM\_ERR\_FAILED

See Table 23 on page 135 for an explanation of the error codes.

#### EnumerateClassNames:

Table 10 defines the properties of the EnumerateClassNames method, which is used to enumerate the names of subclasses of a class defined within the target namespace.

Table 10. EnumerateClassNames method parameters

| Parameter       | Type    | Description                                                                                                                                                      |
|-----------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ClassName       | String  | Defines the name of the class for which subclass names are to be returned. If this field is NULL, all base class names within the target namespace are returned. |
| DeepInheritance | Boolean | TRUE returns all subclass names of the specified class. FALSE returns only immediate child subclass names.                                                       |

**Return values:** If successful, zero or more class names are returned. Otherwise, one of the following error codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE
- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_INVALID\_CLASS
- CIM\_ERR\_FAILED

See Table 23 on page 135 for an explanation of the error codes.

#### EnumerateInstances:

Table 11 defines the properties of the EnumerateInstances method, which is used to enumerate instances of a class defined in the target namespace.

Table 11. EnumerateInstances method parameters

| Parameter | Type   | Description                                                           |
|-----------|--------|-----------------------------------------------------------------------|
| ClassName | String | Defines the name of the class for which instances are to be returned. |

Table 11. EnumerateInstances method parameters (continued)

| Parameter          | Type    | Description                                                                                                                                                         |
|--------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LocalOnly          | Boolean | TRUE returns all properties, methods, and qualifiers that are overridden within the definition of the class.                                                        |
| DeepInheritance    | Boolean | TRUE returns all instances and all properties of the instance, including those added by subclassing. FALSE returns only properties defined for the specified class. |
| IncludeQualifiers  | Boolean | TRUE returns all qualifiers for each instance, its properties, methods, or method parameters. FALSE returns no qualifiers.                                          |
| IncludeClassOrigin | Boolean | TRUE returns the CLASSORIGIN attribute of the class within the instance.                                                                                            |

**Return values:** If successful, zero or more instances (Objects) are returned. Otherwise, one of the following error codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE
- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_INVALID\_CLASS
- CIM\_ERR\_FAILED

See Table 23 on page 135 for an explanation of the error codes.

#### EnumerateInstanceNames:

Table 12 defines the properties of the EnumerateInstanceNames method, which is used to enumerate the names of the instances of a class within a target namespace.

Table 12. EnumerateInstanceNames method parameters

| Parameter | Type   | Description                                                                |
|-----------|--------|----------------------------------------------------------------------------|
| ClassName | String | Defines the name of the class for which instance names are to be returned. |

**Return values:** If successful, zero or more names of instances are returned. Otherwise, one of the following error codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE
- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_INVALID\_CLASS
- CIM\_ERR\_FAILED

See Table 23 on page 135 for an explanation of the error codes.

#### ExecQuery:

Table 13 defines the properties of the ExecQuery method, which is used to execute a query against the target namespace.

Table 13. ExecQuery method parameters

| Parameter     | Type   | Description                                                           |
|---------------|--------|-----------------------------------------------------------------------|
| QueryLanguage | String | Defines the query language in which the query parameter is expressed. |

Table 13. ExecQuery method parameters (continued)

| Parameter | Type   | Description                       |
|-----------|--------|-----------------------------------|
| Query     | String | Defines the query to be executed. |

**Return values:** If successful, zero or more classes (CIMClass) or instances (Objects) are returned. Otherwise, one of the following error codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE
- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_INVALID\_CLASS
- CIM\_ERR\_FAILED

See Table 23 on page 135 for an explanation of the error codes.

#### Associators:

Table 14 defines the properties of the Associators method, which is used to enumerate classes or instances that are associated to a particular CIM Object.

Table 14. Associators method parameters

| Parameter          | Type    | Description                                                                                                                                                                                                                                                                                            |
|--------------------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ObjectName         | String  | Defines the class name or instance name that is the source of the association.                                                                                                                                                                                                                         |
| AssocClass         | String  | If not NULL, indicates that all objects must be associated to the source object through an instance of this class or one of its subclasses.                                                                                                                                                            |
| ResultClass        | String  | If not NULL, indicates that all returned objects must be instances of this class or one of its subclasses or be this class.                                                                                                                                                                            |
| Role               | String  | If not NULL, indicates that each return object must be associated to the source object through an association in which the source object plays the specified role. The name of the property in the association class that refers to the source object must match the value of this parameter.          |
| ResultRole         | String  | If not NULL, indicates that each returned object must be associated to the source object via an association in which the return object plays the specified role. That is, the name of the property in the association class that refers to the returned object must match the value of this parameter. |
| IncludeQualifiers  | Boolean | TRUE returns all qualifiers for the class, its properties, methods, or method parameters. FALSE returns no qualifiers.                                                                                                                                                                                 |
| IncludeClassOrigin | Boolean | TRUE returns the CLASSORIGIN attribute of the class.                                                                                                                                                                                                                                                   |

**Return values:** If successful, zero or more classes (CIMClass) or instances (Objects) are returned. Otherwise, one of the following error codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE
- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_INVALID\_CLASS
- CIM\_ERR\_FAILED

See Table 23 on page 135 for an explanation of the error codes.

#### AssociatorNames:

Table 15 defines the properties of the AssociatorNames method, which is used to enumerate the names of the classes or instances that are associated with a particular CIM Object.

Table 15. AssociatorNames method parameters

| Parameter   | Type   | Description                                                                                                                                                                  |
|-------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ObjectName  | String | Defines the class name or instances name that is the source of the association.                                                                                              |
| AssocClass  | String | If not NULL, indicates that all object paths returned identify an object that is associated to the source object through an instance of this class or one of its subclasses. |
| ResultClass | String | If not NULL, indicates that all returned object paths must identify instances of this class or one of its subclasses or must be this class.                                  |
| Role        | String | If not NULL, the name of the property in the association class that refers to the source object must match the value of this parameter.                                      |
| ResultRole  | String | If not NULL, the name of the property in the association class that refers to the return object must match the value of this parameter.                                      |

**Return values:** If successful, zero or more class paths (CIMObjectPath) are returned. Otherwise, one of the following error codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE
- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_FAILED

See Table 23 on page 135 for an explanation of the error codes.

#### References:

Table 16 defines the properties of the References method, which is used to enumerate the association objects that refer to a particular target class or instance.

Table 16. References method parameters

| Parameter          | Type    | Description                                                                                                                                                         |
|--------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ObjectName         | String  | Defines the class name or instance name whose referring objects are to be returned.                                                                                 |
| ResultClass        | String  | If not NULL, indicates that all returned objects must be instances of this class or one of its subclasses or must be this class.                                    |
| Role               | String  | If not NULL, must be a valid property name. Each returned object must refer to the target object through a property whose name matches the value of this parameter. |
| IncludeQualifiers  | Boolean | TRUE returns all qualifiers for the class, its properties, methods, or method parameters. FALSE returns no qualifiers.                                              |
| IncludeClassOrigin | Boolean | TRUE returns the CLASSORIGIN attribute of the class.                                                                                                                |

**Return values:** If successful, zero or more classes (CIMClass) or instances (Objects) are returned. Otherwise, one of the following error codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE
- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_INVALID\_CLASS

- CIM\_ERR\_FAILED

See Table 23 on page 135 for an explanation of the error codes.

#### ReferenceNames:

Table 17 defines the properties of the ReferenceNames method, which is used to enumerate the association objects that refer to a particular target class or instance.

Table 17. ReferenceNames method parameters

| Parameter   | Type   | Description                                                                                                                                                         |
|-------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ObjectName  | String | Defines the class name or instance name whose referring objects are to be returned.                                                                                 |
| ResultClass | String | If not NULL, indicates that all returned object paths must be object paths of instances of this class or one of its subclasses, or must be this class.              |
| Role        | String | If not NULL, must be a valid property name. Each returned object must refer to the target object through a property whose name matches the value of this parameter. |

**Return values:** If successful, the return value specifies the value of the requested property. Otherwise, one of the following error codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE
- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_INVALID\_CLASS
- CIM\_ERR\_NOT\_FOUND
- CIM\_ERR\_NO\_SUCH\_PROPERTY
- CIM\_ERR\_FAILED

See Table 23 on page 135 for an explanation of the error codes.

#### GetProperty:

Table 18 defines the properties of the GetProperty method, which is used to retrieve a single property value from an instance in the target namespace.

Table 18. GetProperty method parameters

| Parameter    | Type   | Description                                                               |
|--------------|--------|---------------------------------------------------------------------------|
| InstanceName | String | Defines the name of the instance.                                         |
| Property     | String | The name of the property whose value is to be returned from the instance. |

**Return values:** If successful, the return value specifies the value of the requested property. Otherwise, one of the following return codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE
- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_INVALID\_CLASS
- CIM\_ERR\_NOT\_FOUND
- CIM\_ERR\_NO\_SUCH\_PROPERTY
- CIM\_ERR\_FAILED

See Table 23 on page 135 for an explanation of the error codes.

### SetProperty:

Table 19 defines the properties of the SetProperty method, which is used to set a single property value within an instance in the target namespace.

Table 19. SetProperty method parameters

| Parameter    | Type   | Description                                            |
|--------------|--------|--------------------------------------------------------|
| InstanceName | String | Defines the name of the instance.                      |
| PropertyName | String | The name of the property whose value is to be updated. |

**Return values:** If successful, the instance is updated. Otherwise, one of the following return codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE
- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_INVALID\_CLASS
- CIM\_ERR\_NOT\_FOUND
- CIM\_ERR\_NO\_SUCH\_PROPERTY
- CIM\_ERR\_TYPE\_MISMATCH
- CIM\_ERR\_FAILED

See Table 23 on page 135 for an explanation of the error codes.

### GetQualifier:

Table 20 defines the properties of the GetQualifier method, which is used to retrieve a single qualifier declaration from the target namespace.

Table 20. GetQualifier method parameters

| Parameter     | Type   | Description                                                |
|---------------|--------|------------------------------------------------------------|
| QualifierName | String | Defines the qualifier whose declaration is to be returned. |

**Return Values:** If successful, the value of the qualifier is returned. Otherwise, one of the following return codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE
- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_NOT\_FOUND
- CIM\_ERR\_FAILED

See Table 23 on page 135 for an explanation of the error codes.

### SetQualifier:

Table 21 on page 133 defines the properties of the SetQualifier method, which is used to create or update a qualifier declaration in the target namespace.



Table 21. SetQualifier method parameters

| Parameter            | Type | Description                                                            |
|----------------------|------|------------------------------------------------------------------------|
| QualifierDeclaration | Void | Defines the qualifier declaration to be added to the target namespace. |

**Return values:** If successful, the qualifier is updated in the target namespace. Otherwise, one of the following error codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE
- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_NOT\_FOUND
- CIM\_ERR\_FAILED

See Table 23 on page 135 for an explanation of the error codes.

#### DeleteQualifier:

The DeleteQualifier method is used to delete a single class from the target namespace.

**Note:** This operation is not supported. The CIM\_ERR\_NOT\_SUPPORTED error message is returned to the client application if a request to execute this operation is received.

#### EnumerateQualifiers:

The EnumerateQualifiers method is used to enumerate qualifier declarations from the target namespace.

There are no parameters for this method.

**Return Values:** If successful, zero or more qualifier declarations are returned. Otherwise, one of the following error codes is returned:

- CIM\_ERR\_ACCESS\_DENIED
- CIM\_ERR\_INVALID\_NAMESPACE
- CIM\_ERR\_INVALID\_PARAMETER
- CIM\_ERR\_FAILED

See Table 23 on page 135 for an explanation of the error codes.

#### Related topics:

- “CIM Agent communication concepts” on page 123
- Appendix A, “ESS API component definitions,” on page 121
- “Error codes returned by the CIMOM” on page 135
- “ESS API class definitions” on page 145
- “ESS class definition schemas” on page 214
- “CIM Agent Functional Groups” on page 134

---

## CIM Agent Functional Groups

Table 22 describes the functional groups supported by the CIM Agent. This information is also returned to a client which makes an OPTIONS request of the CIM Agent.

Table 22. Functional groups for the CIM Agent

| Functional group      | Parameters                                                                                                                                                                                                                    | Supported or Not Supported |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| Basic read            | <ul style="list-style-type: none"><li>• GetClass</li><li>• EnumerateClasses</li><li>• EnumerateClassNames</li><li>• GetInstance</li><li>• EnumerateInstances</li><li>• EnumerateInstanceNames</li><li>• GetProperty</li></ul> | Supported                  |
| Basic write           | <ul style="list-style-type: none"><li>• SetProperty</li></ul>                                                                                                                                                                 | Supported                  |
| Schema manipulation   | <ul style="list-style-type: none"><li>• CreateClass</li><li>• ModifyClass</li><li>• DeleteClass</li></ul>                                                                                                                     | Not Supported              |
| Instance manipulation | <ul style="list-style-type: none"><li>• CreateInstance</li><li>• ModifyInstance</li><li>• DeleteInstance</li></ul>                                                                                                            | Supported                  |
| Association traversal | <ul style="list-style-type: none"><li>• Associators</li><li>• AssociatorNames</li><li>• References</li><li>• ReferenceNames</li></ul>                                                                                         | Supported                  |
| Qualifier declaration | <ul style="list-style-type: none"><li>• GetQualifier</li><li>• SetQualifier</li><li>• DeleteQualifier</li><li>• EnumerateQualifiers</li></ul>                                                                                 | Supported                  |
| Query execution       | <ul style="list-style-type: none"><li>• ExecQuery</li></ul>                                                                                                                                                                   | Supported                  |

### Related topics:

- “CIM Agent communication concepts” on page 123
- Appendix A, “ESS API component definitions,” on page 121
- “CIM Agent Communication methods” on page 124
- “Error codes returned by the CIMOM” on page 135
- “ESS API class definitions” on page 145
- “ESS class definition schemas” on page 214

## Error codes returned by the CIMOM

This section identifies the possible error codes returned by CIMOM communication methods.

### Return Error Codes:

The CIMOM might return status to the client application in one of two ways:

- Through HTTP status messages or
- Through error codes contained within <METHODRESPONSE> or <IMETHODRESPONSE> XML tags

Table 23 describes the status codes that the CIMOM might return.

Table 23. Return error codes for the CIMOM

| Symbolic Name                        | Code | Definition                                                                         |
|--------------------------------------|------|------------------------------------------------------------------------------------|
| CIM_ERR_FAILED                       | 1    | A general error occurred that is not covered by a more specific error code.        |
| CIM_ERR_ACCESS_DENIED                | 2    | Access to a CIM resource was not available to the client.                          |
| CIM_ERR_INVALID_NAMESPACE            | 3    | The target namespace does not exist.                                               |
| CIM_ERR_INVALID_PARAMETER            | 4    | One or more parameter values passed to the method were invalid.                    |
| CIM_ERR_INVALID_CLASS                | 5    | The specified class does not exist.                                                |
| CIM_ERR_NOT_FOUND                    | 6    | The requested object could not be found.                                           |
| CIM_ERR_NOT_SUPPORTED                | 7    | The requested operation is not supported.                                          |
| CIM_ERR_CLASS_HAS_CHILDREN           | 8    | The operation cannot be carried out on this class because it has instances.        |
| CIM_ERR_CLASS_HAS_INSTANCES          | 9    | The operation cannot be carried out on this class because it has instances.        |
| CIM_ERR_INVALID_SUPERCLASS           | 10   | The operation cannot be carried out since the specified superclass does not exist. |
| CIM_ERR_ALREADY_EXISTS               | 11   | The operation cannot be carried out because an object already exists.              |
| CIM_ERR_NO_SUCH_PROPERTY             | 12   | The specified property does not exist.                                             |
| CIM_ERR_TYPE_MISMATCH                | 13   | The value supplied is incompatible with the type.                                  |
| CIM_ERR_QUERY_LANGUAGE_NOT_SUPPORTED | 14   | The query language is not recognized or supported.                                 |
| CIM_ERR_INVALID_QUERY                | 15   | The query is not valid for the specified query language.                           |
| CIM_ERR_METHOD_NOT_AVAILABLE         | 16   | The extrinsic method could not be executed.                                        |
| CIM_ERR_METHOD_NOT_FOUND             | 17   | The specified extrinsic method does not exist.                                     |
| CIM_ERR_LOW_ON_MEMORY                | 20   | There is not enough memory.                                                        |
| XMLERROR                             | 21   | An XML error has occurred.                                                         |
| CIM_ERR_LISTNER_ALREADY_DEFINED      | 22   | The listener is already defined`.                                                  |
| CIM_ERR_INDICATION_NOT_COLLECTED     | 23   | The indications are not collected.                                                 |
| CIM_ERR_NO_METHOD_NAME               | 24   | The method name is null.                                                           |

Table 23. Return error codes for the CIMON (continued)

| Symbolic Name                               | Code | Definition                                                                                                         |
|---------------------------------------------|------|--------------------------------------------------------------------------------------------------------------------|
| CIM_ERR_INVALID_QUALIFIER_DATATYPE          | 25   | The datatype qualifier is invalid.                                                                                 |
| CIM_ERR_NAMESPACE_NOT_IN_MANAGER            | 26   | The namespace value is not found.                                                                                  |
| CIM_ERR_INSTANTIATE_FAILED                  | 27   | The instantiation failed.                                                                                          |
| CIM_ERR_FAILED_TO_LOCATE_INDICATION_HANDLER | 28   | The indication handler is not found.                                                                               |
| CIM_ERR_IO_EXCEPTION                        | 29   | An IO exception has occurred.                                                                                      |
| CIM_ERR_COULD_NOT_DELETE_FILE               | 30   | The file could not be deleted.                                                                                     |
| INVALID_QUALIFIER_NAME                      | 31   | The qualifier name is null.                                                                                        |
| NO_QUALIFIER_VALUE                          | 32   | The qualifier value is null.                                                                                       |
| NO_SUCH_QUALIFIER1                          | 33   | There is no such qualifier.                                                                                        |
| NO_SUCH_QUALIFIER2                          | 34   | There is no such qualifier.                                                                                        |
| QUALIFIER_UNOVERRIDABLE                     | 35   | The qualifer is unoverridable.                                                                                     |
| SCOPE_ERROR                                 | 36   | A scope error has occurred.                                                                                        |
| TYPE_ERROR                                  | 37   | A type error has occurred.                                                                                         |
| CIM_ERR_MISSING_KEY                         | 38   | The key is missing.                                                                                                |
| CIM_ERR_KEY_CANNOT_MODIFY                   | 39   | The key cannot be modified.                                                                                        |
| CIM_ERR_NO_KEYS                             | 40   | There are no keys found.                                                                                           |
| CIM_ERR_KEYS_NOT_UNIQUE                     | 41   | The keys are not unique.                                                                                           |
| CIM_ERR_SET_CLASS_NOT_SUPPORTED             | 100  | The set class operation is not supported.                                                                          |
| CIM_ERR_SET_INSTANCE_NOT_SUPPORTED          | 101  | The set instance operation is not supported.                                                                       |
| CIM_ERR_QUALIFIER_NOT_FOUND                 | 102  | The qualifier value is not found.                                                                                  |
| CIM_ERR_QUALIFIERTYPE_NOT_FOUND             | 103  | The qualifier type is not found.                                                                                   |
| CIM_ERR_CONNECTION_FAILURE                  | 104  | The connection failed.                                                                                             |
| CIM_ERR_FAIL_TO_WRITE_TO_SERVER             | 105  | There is a fail to write to the server.                                                                            |
| CIM_ERR_SERVER_NOT_SPECIFIED                | 106  | The server not specified.                                                                                          |
| CIM_ERR_INDICATION_ERROR                    | 107  | There is an indication processing error.                                                                           |
| CIM_ERR_FAIL_TO_WRITE_TO_CIMOM              | 108  | There is a fail to write to the CIMOM.                                                                             |
| CIM_ERR_SUBSCRIPTION_EXISTS                 | 109  | A subscription already exists.                                                                                     |
| CIM_ERR_INVALID_SUBSCRIPTION_DEST           | 110  | The subscription destination is invalid.                                                                           |
| CIM_ERR_INVALID_FILTER_PATH                 | 111  | The filter path is invalid.                                                                                        |
| CIM_ERR_INVALID_HANDLER_PATH                | 112  | The handler path is invalid.                                                                                       |
| CIM_ERR_NO_FILTER_INSTANCE                  | 113  | The filter instance is not found.                                                                                  |
| CIM_ERR_NO_HANDLER_INSTANCE                 | 114  | The handler instance is not found.                                                                                 |
| CIM_ERR_UNSUPPPORTED_FILTER                 | 115  | There is an unsupported filter referenced in the subscription.                                                     |
| CIM_ERR_INVALID_TRUSTSTORE                  | 116  | The CIMOM cannot be connected to because there is a bad or missing truststore or an incorrect truststore password. |
| CIM_ERR_ALREADY_CONNECTED                   | 117  | The CIMOM cannot be connected to because it is already connected.                                                  |
| CIM_ERR_UNKNOWN_SERVER                      | 118  | The server is unknown. The CIMOM cannot be connected to.                                                           |

Table 23. Return error codes for the CIMON (continued)

| Symbolic Name               | Code | Definition                                                                               |
|-----------------------------|------|------------------------------------------------------------------------------------------|
| CIM_ERR_INVALID_CERTIFICATE | 119  | The correct certificate cannot be found in truststore. The CIMOM cannot be connected to. |

**Related topics:**

- “CIM Agent communication concepts” on page 123
- Appendix A, “ESS API component definitions,” on page 121
- “CIM Agent Communication methods” on page 124
- “ESS API class definitions” on page 145
- “ESS class definition schemas” on page 214



## Appendix C. CIM Agent class information for the ESS API

The CIM Agent uses the classes that are described in this section to manage the implementation of the ESS API. A visual representation of the CIM agent architecture for the ESS is also included. This information assists you in writing your ESS API-based applications. This section includes the following information:

- CIM Agent class definitions quick reference
- CIM Agent class definitions
- ESS class definition schemas

### CIM Agent class definitions quick reference

Table 24 provides a quick reference for the CIM Agent class definitions.

Table 24. CIM Agent class definitions (quick reference)

| IBMTSESS class name                   | Description                                                                                                                                                                           | Related section      |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| IBMTSESS_AllocatedFromStoragePool     | An association that associates a volume with the volumespace from which it is allocated; derived from the CIM_AllocatedFromStoragePool class.                                         | Table 36 on page 168 |
| IBMTSESS_AuthorizedSubject            | An association that ties specific privileges to specific subjects (for example, identities or roles). The IBMTSESS_AuthorizedSubject is derived from the CIM_AuthorizedSubject class. | Table 43 on page 170 |
| IBMTSESS_AuthorizedTarget             | An association that ties the identity or role privileges to specific target resources. The IBMTSESS_AuthorizedTarget is derived from the CIM_AuthorizedTarget class.                  | Table 42 on page 170 |
| IBMTSESS_Chassis                      | A representation of a chassis that contains one physical ESS; derived from the CIM_Chassis class.                                                                                     | Table 55 on page 176 |
| IBMTSESS_Component                    | An association between storage extent and VolumeSpace. The IBMTSESS_Component is derived from the CIM_Component class.                                                                | Table 83 on page 201 |
| IBMTSESS_ComputerSystemPackage        | An association between a physical package and the computer system; derived from the CIM_ComputerSystemPackage class.                                                                  | Table 56 on page 177 |
| IBMTSESS_ComputerSystemPackageCard    | An association between a physical package and the computer system; derived from the CIM_ComputerSystemPackage class.                                                                  | Table 63 on page 181 |
| IBMTSESS_ConcreteDependencyController | A generic association that establishes dependency relationships between managed elements. The IBMTSESS_ConcreteDependencyController is derived from the CIM_ConcreteDependency class. | Table 74 on page 194 |
| IBMTSESS_ConcreteDependencyPrivilege  | A generic association that establishes dependency relationships between managed elements. The IBMTSESS_ConcreteDependencyPrivilege is derived from the CIM_ConcreteDependency class.  | Table 44 on page 171 |

Table 24. CIM Agent class definitions (quick reference) (continued)

| IBMTSESS class name                          | Description                                                                                                                                                                                                                          | Related section      |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| IBMTSESS_ConcreteDependencyStorageHardwareID | A generic association that establishes dependency relationships between managed elements. The IBMTSESS_ConcreteDependencyStorageHardwareID is derived from the CIM_ConcreteDependency class.                                         | Table 45 on page 171 |
| IBMTSESS_ConcretelidentityCapSet             | An association that associates two elements representing different aspects of the same underlying entity; derived from the CIM_Concretelidentity class.                                                                              | Table 58 on page 178 |
| IBMTSESS_ControllerConfigurationService      | Includes methods that allow a client to manipulate LUN Masking in a storage system. The IBMTSESS_ControllerConfigurationService is derived from the CIM_ControllerConfigurationService class.                                        | Table 70 on page 185 |
| IBMTSESS_DeviceMaskingCapabilities           | A subclass of capabilities that defines the masking-related capabilities of a storage system. The IBMTSESS_DeviceMaskingCapabilities is derived from the CIM_ProtocolControllerMaskingCapabilities class.                            | Table 72 on page 191 |
| IBMTSESS_DiskDrive                           | A description of the physical disk on the ESS; derived from the CIM_DiskDrive class.                                                                                                                                                 | Table 65 on page 181 |
| IBMTSESS_ElementCapabilities                 | An association between managed elements and their capabilities; derived from the CIM_ElementCapabilities class.                                                                                                                      | Table 51 on page 173 |
| IBMTSESS_ElementCapabilitiesMasking          | An association between managed elements and their capabilities. The IBMTSESS_ElementCapabilitiesMasking is derived from the CIM_ElementCapabilities class.                                                                           | Table 73 on page 194 |
| IBMTSESS_ElementConformsToProfile            | The registered profile that a managed element is conformant to. The IBMTSESS_ElementConformsToProfile is derived from the CIM_ElementConformsToProfile class.                                                                        | Table 77 on page 197 |
| IBMTSESS_ElementSettingData                  | An association between managed elements and applicable setting data. This association also describes whether this is a default or current setting. The IBMTSESS_ElementSettingData is derived from the CIM_ElementSettingData class. | Table 50 on page 172 |
| IBMTSESS_EltCapabilitiesStgPool              | An association between managed elements and their capabilities. The IBMTSESS_EltCapabilitiesStgPool is derived from the CIM_ElementCapabilities class.                                                                               | Table 87 on page 203 |
| IBMTSESS_ExtraCapacitySet                    | A description of the type of redundancy available in the storage system; derived from the CIM_ExtraCapacitySet class.                                                                                                                | Table 57 on page 177 |
| IBMTSESS_FCPort                              | A description of a single fibre-channel adapter I/O port on the ESS; derived from the CIM_FCPort class.                                                                                                                              | Table 28 on page 151 |



Table 24. CIM Agent class definitions (quick reference) (continued)

| IBMTSESS class name                  | Description                                                                                                                                                                                                                                    | Related section      |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| IBMTSESS_HostedAccessPoint           | An association between a service access point and the system on which it is provided; derived from the CIM_HostedAccessPoint class.                                                                                                            | Table 61 on page 180 |
| IBMTSESS_HostedPrimordialStoragePool | An association that establishes that the storagepool is defined in the context of the primordialstoragepool. The IBMTSESS_HostedPrimordialStoragePool is derived from the CIM_HostedStoragePool class.                                         | Table 85 on page 203 |
| IBMTSESS_HostedService               | An association between a system and the storage configuration service; derived from the CIM_HostedService class.                                                                                                                               | Table 46 on page 171 |
| IBMTSESS_HostedService2              | An association between a system and the privilege management service; derived from the CIM_HostedService class.                                                                                                                                | Table 47 on page 172 |
| IBMTSESS_HostedService3              | An association between a system and the storage hardware ID management service; derived from the CIM_HostedService class.                                                                                                                      | Table 48 on page 172 |
| IBMTSESS_HostedService4              | An association between a system and the controller configuration service; derived from the CIM_HostedService class.                                                                                                                            | Table 71 on page 191 |
| IBMTSESS_HostedService6              | An association between a service and the system on which the functionality resides. The IBMTSESS_HostedService6 is derived from the CIM_HostedService class.                                                                                   | Table 94 on page 211 |
| IBMTSESS_HostedStoragePool           | An association that establishes that the storage pool is defined in the context of the System; derived from the CIM_HostedStoragePool class.                                                                                                   | Table 52 on page 173 |
| IBMTSESS_InitiatorElementSettingData | The association between managed elements and applicable setting data. This association also describes whether this is a default or current setting. The IBMTSESS_InitiatorElementSettingData is derived from the CIM_ElementSettingData class. | Table 81 on page 198 |
| IBMTSESS_Location                    | The position and address of a physical element. The IBMTSESS_Location is derived from the CIM_Location class.                                                                                                                                  | Table 78 on page 197 |
| IBMTSESS_LunMaskPrivilegeService     | Manages privilege instances. The IBMTSESS_LunMaskPrivilegeService is derived from the LunMaskPrivilegeService class.                                                                                                                           | Table 33 on page 163 |
| IBMTSESS_MemberOfCollection          | An aggregation used to establish membership of managed elements in a Collection; derived from the CIM_MemberOfCollection class.                                                                                                                | Table 64 on page 181 |
| IBMTSESS_MediaPresent                | An association between a media access device and the storage extent; derived from the CIM_MediaPresent class.                                                                                                                                  | Table 67 on page 184 |
| IBMTSESS_MediaPresentExtent          | The association between a media access device and the StorageExtent. The IBMTSESS_MediaPresentExtent is derived from the CIM_MediaPresent class.                                                                                               | Table 49 on page 172 |

Table 24. CIM Agent class definitions (quick reference) (continued)

| IBMTSESS class name                   | Description                                                                                                                                                                                                                                                              | Related section      |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| IBMTSESS_PerformanceStatisticsService | Includes methods that enable and disable the collection of performance statistics. In addition, it supports a method to retrieve the statistics file for ESS volumes and volume spaces. The IBMTSESS_PerformanceStatisticsService is derived from the CIM_Service class. | Table 93 on page 209 |
| IBMTSESS_PhysicalElementLocation      | A description of the association between a physical element with a location object for inventory or replacement purposes. The IBMTSESS_PhysicalElementLocation is derived from the CIM_PhysicalElementLocation class.                                                    | Table 79 on page 197 |
| IBMTSESS_PhysicalPackage              | A representation of physical elements that contain or host other components; derived from the CIM_PhysicalPackage class.                                                                                                                                                 | Table 66 on page 183 |
| IBMTSESS_PPRCPath                     | Derived from the CIM_LogicalDevice class.                                                                                                                                                                                                                                | Table 98 on page 213 |
| IBMTSESS_PrimitiveStoragePool         | Derived from the CIM_StoragePool class.                                                                                                                                                                                                                                  | Table 84 on page 201 |
| IBMTSESS_Privilege                    | Derived from the CIM_Privilege class.                                                                                                                                                                                                                                    | Table 30 on page 153 |
| IBMTSESS_Product                      | A representation of the top-level description of physical components that make up a product, in this case, the entire ESS; derived from the CIM_Product class.                                                                                                           | Table 35 on page 167 |
| IBMTSESS_ProductPhysicalComponent     | An association that indicates that the referenced physical element is acquired as part of a product; derived from the CIM_ProductPhysicalComponent class.                                                                                                                | Table 59 on page 179 |
| IBMTSESS_ProtocolControllerForPort    | An association that defines a relationship between a protocol controllers and a port. The IBMTSESS_ProtocolControllerForPort is derived from the CIM_ProtocolControllerForPort class.                                                                                    | Table 41 on page 169 |
| IBMTSESS_ProtocolControllerForUnit    | An association that defines a relationship between a protocol controllers and an exposed logical unit (for example, a storage volume). The IBMTSESS_ProtocolControllerForUnit is derived from the CIM_ProtocolControllerForUnit class.                                   | Table 40 on page 169 |
| IBMTSESS_Provider                     | Derived from the CIM_Provider class.                                                                                                                                                                                                                                     | Table 88 on page 204 |
| IBMTSESS_Realizes                     | An association that associates a logical device and the physical elements that implement them; derived from the CIM_Realizes class.                                                                                                                                      | Table 68 on page 184 |
| IBMTSESS_RegisteredProfile            | The IBMTSESS_RegisteredProfile is derived from the CIM_RegisteredProfile class.                                                                                                                                                                                          | Table 75 on page 195 |
| IBMTSESS_RemoteServiceAccessPoint     | A description of access and addressing information for a remote connection that is known to a local network element; derived from the CIM_RemoteServiceAccessPoint class.                                                                                                | Table 60 on page 179 |

Table 24. CIM Agent class definitions (quick reference) (continued)

| IBMTSESS class name                         | Description                                                                                                                                                                                                                                                                                | Related section      |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| IBMTSESS_RemoteSourceStorageSynchronized    | A representation of the relationship involving a remote domain volume. For this association the remote volume is the source and the local volume the target. The IBMTSESS_RemoteSourceStorageSynchronized is derived from the CIM_ManagedElement class.                                    | Table 96 on page 211 |
| IBMTSESS_RemoteTargetStorageSynchronized    | A representation of the relationship involving a remote domain volume. For this association the remote volume is the target and the local volume is the source of the relationship. The IBMTSESS_RemoteTargetStorageSynchronized is derived from the CIM_ManagedElement class.             | Table 97 on page 212 |
| IBMTSESS_RemoteVolume                       | A representation of a volume that is contained within a domain that is inaccessible. IBMTSESS_RemoteVolume has PPRC copy relationship with IBMTSESS_Volume, which is contained within a domain that is accessible. The IBMTSESS_RemoteVolume is derived from the CIM_ManagedElement class. | Table 95 on page 211 |
| IBMTSESS_SCSIProtocolController             | Derived from the CIM_SCSIProtocolController class.                                                                                                                                                                                                                                         | Table 29 on page 152 |
| IBMTSESS_StorageCapabilities                | There is one instance for all the ESS machines; derived from the CIM_StorageCapabilities class.                                                                                                                                                                                            | Table 53 on page 173 |
| IBMTSESS_StorageClientSettingData           | Derived from the CIM_StorageClientSettingData class.                                                                                                                                                                                                                                       | Table 80 on page 198 |
| IBMTSESS_StorageConfigurationService        | A service provided by the CIM Agent to enable volume creation, volumespace creation, volumespace deletion and copy services functions; derived from the CIM_StorageConfigurationService class.                                                                                             | Table 32 on page 155 |
| IBMTSESS_StorageExtent                      | Derived from the CIM_StorageExtent class.                                                                                                                                                                                                                                                  | Table 82 on page 199 |
| IBMTSESS_StorageHardwareID                  | Derived from the CIM_StorageHardwareID class.                                                                                                                                                                                                                                              | Table 31 on page 154 |
| IBMTSESS_StorageHardwareIDManagementService | Includes methods for creating creating and deleting storage hardware IDs; derived from the CIM_StorageHardwareIDManagementService class.                                                                                                                                                   | Table 34 on page 166 |
| IBMTSESS_StorageSetting                     | A service level objective. There are two instances for all the ESS machines; derived from the CIM_StorageSetting class.                                                                                                                                                                    | Table 54 on page 175 |
| IBMTSESS_StorageProcessorCard               | A representation of a type of physical container that can be plugged into another card or hosting board, or is itself a hosting board or mother board in a chassis. Each ESS has two instances of IBMTSESS_StorageProcessorCard; derived from the CIM_Card class.                          | Table 62 on page 180 |

Table 24. CIM Agent class definitions (quick reference) (continued)

| IBMTSESS class name                 | Description                                                                                                                                                                                 | Related section      |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| IBMTSESS_StorageSynchronized        | An association that indicates that two storage objects were replicated at the specified point in time. The IBMTSESS_StorageSynchronized is derived from the CIM_StorageSynchronized class.  | Table 86 on page 203 |
| IBMTSESS_StorageSystem              | A representation of the entire ESS machine in the configuration; derived from the CIM_ComputerSystem class.                                                                                 | Table 25 on page 145 |
| IBMTSESS_StorageSystemToController  | An association that associates a controller with a storage subsystem; derived from the CIM_SystemDevice.                                                                                    | Table 39 on page 169 |
| IBMTSESS_StorageSystemToPort        | An association that associates a port with a storage subsystem; derived from the CIM_SystemDevice class.                                                                                    | Table 38 on page 168 |
| IBMTSESS_StorageSystemToVolume      | An association that associates a volume with a storage subsystem; derived from the CIM_SystemDevice class.                                                                                  | Table 37 on page 168 |
| IBMTSESS_SubProfileExtendsProfile   | Derived from the CIM_ReferencedProfile class.                                                                                                                                               | Table 76 on page 196 |
| IBMTSESS_SystemDevice               | An association that describes the aggregation of logical devices by a system; derived from the CIM_SystemDevice class.                                                                      | Table 69 on page 185 |
| IBMTSESS_Volume                     | A representation one storage volume for the ESS; derived from the CIM_StorageVolume class.                                                                                                  | Table 27 on page 147 |
| IBMTSESS_VolumeSpace                | A representation of an ESS volume group from which storage volumes can be created; derived from the CIM_StoragePool class.                                                                  | Table 26 on page 146 |
| IBMTSESS_VolumeStatisticalData      | A connection is made from the IBMTSESS_Volume with its corresponding statistics instance. The IBMTSESS_VolumeStatisticalData is derived from the CIM_ElementStatisticalData class.          | Table 91 on page 208 |
| IBMTSESS_VolumeSpaceStatisticalData | A connection is made between IBMTSESS_VolumeSpace with its corresponding statistics instance. The IBMTSESS_VolumeSpaceStatisticalData is derived from the CIM_ElementStatisticalData class. | Table 92 on page 209 |
| IBMTSESS_VolumeSpaceStatistics      | Derived from the CIM_StatisticalData class.                                                                                                                                                 | Table 90 on page 207 |
| IBMTSESS_VolumeStatistics           | Derived from the CIM_StatisticalData class.                                                                                                                                                 | Table 89 on page 204 |

**Related topics:**

- “ESS API class definitions” on page 145
- “ESS class definition schemas” on page 214

## ESS API class definitions

The following class definition tables list the properties, types, qualifiers, and descriptions, for each CIM Agent class definition. Each table lists the properties, qualifiers, and descriptions for one class.

Table 25. IBMTSESS\_StorageSystem class properties

| Property                         | Type     | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                        |
|----------------------------------|----------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>        |          |                        |                                                                                                                                                                                                                                                                                                                    |
| Caption                          | String   | MaxLen(64)             | Short textual description.                                                                                                                                                                                                                                                                                         |
| Description                      | String   |                        | Textual description of the object.                                                                                                                                                                                                                                                                                 |
| ElementName                      | String   |                        | This property enables each instance to define a user-friendly name in addition to its key properties or identity data, and description information.<br><br>The value for IBMTSESS_StorageSystem is Enterprise Storage Server.                                                                                      |
| <i>CIM_ManagedSystemElement</i>  |          |                        |                                                                                                                                                                                                                                                                                                                    |
| InstallDate                      | datetime |                        | When the object was installed. A lack of a value does not indicate that the object is not installed.                                                                                                                                                                                                               |
| Name                             | String   | MaxLen(256)            | Defines the label by which the object is known. When subclassed, the Name property can be overridden to be a Key property.                                                                                                                                                                                         |
| OperationalStatus[]              | uint16   |                        | Indicates the current status of the element. The following functional and nonfunctional statuses are defined: 2 (OK), 6 (Error), 11 (In Service) , 12 (No Contact).<br><b>Note:</b> The same object can have multiple statuses.<br><br>The value for IBMTSESS_StorageSystem is 2.                                  |
| <i>CIM_LogicalElement</i>        |          |                        |                                                                                                                                                                                                                                                                                                                    |
| <i>CIM_EnabledLogicalElement</i> |          |                        |                                                                                                                                                                                                                                                                                                                    |
| EnabledStatus                    | uint16   |                        | Indicates if the element is currently shutting down (value=4), in an enabled state (value=2), or in a disabled state (value=3).                                                                                                                                                                                    |
| OtherEnabledStatus               | String   |                        | Describes the enabled or disabled state of the element when the EnabledStatus property is set to 1 (other).                                                                                                                                                                                                        |
| <i>CIM_System</i>                |          |                        |                                                                                                                                                                                                                                                                                                                    |
| CreationClassName                | String   | Key, MaxLen(256)       | Indicates the name of the class or the subclass used in the creation of an instance. When used with the other key properties of this class, this property enables all instances of this class and its subclasses to be uniquely identified.<br><br>The value for IBMTSESS_StorageSystem is IBMTSESS_StorageSystem. |
| Name                             | String   | Key, MaxLen(256)       | Serves as the key of a System instance in an enterprise environment.<br><br>The value for IBMTSESS_StorageSystem is the serial number of the ESS.                                                                                                                                                                  |
| NameFormat                       | String   |                        | Identifies how the System name was generated.<br><br>The value for IBMTSESS_StorageSystem is Other.                                                                                                                                                                                                                |

Table 25. IBMTSESS\_StorageSystem class properties (continued)

| Property                      | Type     | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                    |
|-------------------------------|----------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PrimaryOwnerName              | String   |                        | The name of the primary system owner.<br><br>The value for IBMTSESS_StorageSystem is IBM Corporation.                                                                                                                                                                          |
| PrimaryOwnerContact           | String   |                        | Provides information on how the primary system owner can be reached.<br><br>The value for IBMTSESS_StorageSystem is IBM Customer.                                                                                                                                              |
| <i>CIM_ComputerSystem</i>     |          |                        |                                                                                                                                                                                                                                                                                |
| OtherIdentifyingInfo          | String[] |                        | Captures additional data, beyond System Name information, that could be used to identify a ComputerSystem.<br><br>The value for IBMTSESS_StorageSystem is {IP address of ESS, the DNS Name of the ESS, the value of WWN for the ESS}.                                          |
| IdentifyingDescriptions       | String[] |                        | Provides explanations and details behind the entries in the OtherIdentifyingInfo array.<br><b>Note:</b> Each entry of this array is related to the entry in OtherIdentifyingInfo that is located at the same index.<br><br>The value is {"ESS IP Address", "DNS Name", "WWN"}. |
| Dedicated                     | uint16[] | BlockServer            | Indicates whether the ComputerSystem is a special-purpose System or general-purpose System.<br><br>The value for IBMTSESS_StorageSystem is {3,15}, which means the System is {"Storage", "BlockServer"}.                                                                       |
| <b>IBMTSESS_StorageSystem</b> |          |                        |                                                                                                                                                                                                                                                                                |
| Model                         | String   |                        | Describes the model number of the ESS.                                                                                                                                                                                                                                         |
| Codelevel                     | String   |                        | Describes the code level of the ESS.                                                                                                                                                                                                                                           |
| Cache                         | String   |                        | Describes the memory size of the ESS in gigabytes.                                                                                                                                                                                                                             |
| NVS                           | String   |                        | Describes nonvolatile storage of the ESS in megabytes. NVS is used to store a second copy of write data to ensure data integrity.                                                                                                                                              |

Table 26. IBMTSESS\_VolumeSpace class properties

| Property                        | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                                       |
|---------------------------------|--------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>       |        |                        |                                                                                                                                                                                                                                   |
| ElementName                     | String |                        | Enables each instance to define a user-friendly name in addition to its key properties or identity data, and description information.<br><br>The value for IBMTSESS_VolumeSpace is VolumeSpace on ESS plus the ESS serial number. |
| <i>CIM_ManagedSystemElement</i> |        |                        |                                                                                                                                                                                                                                   |

Table 26. IBMTSESS\_VolumeSpace class properties (continued)

| Property              | Type     | Qualifier or Parameter | Description                                                                                                                                                                                                   |
|-----------------------|----------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OperationalStatus     | uint16[] |                        | Indicates the current status of the element. Various functional and nonfunctional statuses are defined: OK (2), Error (6), In Service (11), Not Contact (12).<br><br>The value for IBMTSESS_VolumeSpace is 2. |
| CIM_LogicalElement    |          |                        |                                                                                                                                                                                                               |
| CIM_StoragePool       |          |                        |                                                                                                                                                                                                               |
| InstanceID            | String   | Key                    | Identifies a unique instance of StoragePool.<br><br>The value for IBMTSESS_VolumeSpace is the volumeSpaceID-ESS ID.                                                                                           |
| RemainingManagedSpace | uint64   |                        | Describes the remaining capacity available in bytes.                                                                                                                                                          |
| Primordial            | Boolean  |                        | If true, \“Primordial\” indicates that the containing System does not have the ability to create or delete this operational element.<br><br>The value for IBMTSESS_VolumeSpace is FALSE.                      |
| PoolID                | String   |                        | A unique name in the context of the system that identifies this pool. The value for IBMTSESS_VolumeSpace is the volumespace ID obtained from esscli command such as “vs0”.                                    |
| TotalManagedSpace     | uint64   |                        | The total amount of raw storage (in bytes) managed by this StoragePool in bytes.                                                                                                                              |
| IBMTSESS_VolumeSpace  |          |                        |                                                                                                                                                                                                               |
| Redundancy            | String   |                        | Describes the volume type (RAID level).                                                                                                                                                                       |
| Cap                   | real32   |                        | Describes the capacity of the VolumeSpace in gigabytes.                                                                                                                                                       |
| Free                  | real32   |                        | Describes the remaining capacity available in gigabytes.                                                                                                                                                      |
| Format                | String   |                        | Describes the format of the volumespace, that is, FB or 3390.                                                                                                                                                 |
| Basedon               | String   |                        | Describes the disk group or disk that the VolumeSpace is based on.                                                                                                                                            |
| Volumes               | uint16   |                        | Describes the number of allocated volumes.                                                                                                                                                                    |
| LSS                   | String   |                        | Describes any volumes allocated in this VolumeSpace that are associated with this logical subsystem.                                                                                                          |
| Status                | String   |                        | Describes the status of VolumeSpace.                                                                                                                                                                          |
| SystemName            | String   |                        | Describes the name of the scoping System.<br><br>The value for IBMTSESS_VolumeSpace is the ESS serial number to which this VolumeSpace belongs.                                                               |
| ssID                  | String   |                        | Describes the SS ID in 4-digits hexadecimal.                                                                                                                                                                  |

Table 27. IBMTSESS\_Volume class properties

| Property           | Type | Qualifier or Parameter | Description |
|--------------------|------|------------------------|-------------|
| CIM_ManagedElement |      |                        |             |

Table 27. IBMTSESS\_Volume class properties (continued)

| Property                         | Type     | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------|----------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ElementName                      | String   |                        | Enables each instance to define a user-friendly name in addition to its key properties or identity data, and description information.<br><br>The value for IBMTSESS_Volume is Volume: LSS + LSSId + VolumeID + volumeID.                                                                                                                                             |
| <i>CIM_ManagedSystemElement</i>  |          |                        |                                                                                                                                                                                                                                                                                                                                                                      |
| Name                             | String   |                        | Defines the label by which the object is known. When subclassed, the Name property can be overridden to be a Key property.<br><br>The value for IBMTSESS_Volume is 00000000000000000000000000000000+volumeID.                                                                                                                                                        |
| OperationalStatus                | uint16[] |                        | Indicates the current statuses of the element.<br><br>The value for IBMTSESS_Volume is 2, which means "OK".                                                                                                                                                                                                                                                          |
| <i>CIM_LogicalElement</i>        |          |                        |                                                                                                                                                                                                                                                                                                                                                                      |
| <i>CIM_EnabledLogicalElement</i> |          |                        |                                                                                                                                                                                                                                                                                                                                                                      |
| EnabledState                     | uint16   |                        | Indicates the enabled or disabled states of an element. ValueMap {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11..32767, 32768..65535 } Values {Unknown, Other, Enabled, Disabled, Shutting Down, Not Applicable, Enabled but Offline, In Test, Deferred, Quiesce, Starting, DMTF Reserved, Vendor Reserved }<br><br>The value for IBMTSESS_Volume is 2 which means "Enabled". |
| RequestedState                   | uint16   |                        | Indicates the last requested or desired state for the element. ValueMap {2, 3, 4, 5, 6, 7, 8, 9, 10..32767, 32768..65535} Values {Enabled, Disabled, Shut Down, No Change, Offline, Test, Deferred, Quiesce, DMTF Reserved, Vendor Reserved}<br><br>The value for IBMTSESS_Volume is 2.                                                                              |
| EnabledDefault                   | uint16   |                        | Indicates an administrator's default or startup configuration for the Enabled Status for an element. By default, the element is Enabled (value=2).                                                                                                                                                                                                                   |
| <i>CIM_LogicalDevice</i>         |          |                        |                                                                                                                                                                                                                                                                                                                                                                      |
| SystemCreationClassName          | String   | Key, MaxLen(256)       | Describes the CreationClassName for the scoping System.<br><br>The value for IBMTSESS_Volume is IBMTSESS_StorageSystem.                                                                                                                                                                                                                                              |
| SystemName                       | String   | Key, MaxLen(256)       | Describes the name of the scoping System.<br><br>The value for IBMTSESS_Volume is the ESS serial number to which this volume belongs.                                                                                                                                                                                                                                |



Table 27. IBMTSESS\_Volume class properties (continued)

| Property                 | Type     | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                          |
|--------------------------|----------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CreationClassName        | String   | Key, MaxLen(256)       | Indicates the name of the class or the subclass used in the creation of an instance. When used with the other key properties of this class, this property enables all instances of this class and its subclasses to be uniquely identified.<br><br>The value for IBMTSESS_Volume is IBMTSESS_Volume. |
| DeviceID                 | String   | Key, MaxLen(64)        | Describes an address or other identifying information to uniquely name the LogicalDevice.<br><br>The value for IBMTSESS_Volume is the volume ID obtained from the esscli, such as 0A05.                                                                                                              |
| OtherIdentifyingInfo     | String[] |                        | Describes the volume serial number.<br><br>The value is the serial number of the volume, such as DBA001.                                                                                                                                                                                             |
| IdentifyingDescriptions  | String[] |                        | Describes an array of free-form strings that provide explanations and details of the entries in the OtherIdentifyingInfo array. Note: Each entry of this array is related to the entry in OtherIdentifyingInfo that is located at the same index. The value for IBMTSESS_Volume is Serial.           |
| <i>CIM_StorageExtent</i> |          |                        |                                                                                                                                                                                                                                                                                                      |
| Access                   | uint16   |                        | Describes whether the media is readable (value=1), writeable (value=2), both readable and writeable (value=3), write once (value=4), unknown (value=0).<br><br>The value for IBMTSESS_Volume is 3.                                                                                                   |
| BlockSize                | uint64   |                        | Describes the size in bytes of the blocks that form this StorageExtent.<br><br>The value for IBMTSESS_Volume is 512.                                                                                                                                                                                 |
| NumberOfBlocks           | uint64   |                        | Describes the total number of logically contiguous blocks, of size Block Size, which form this Extent. The total size of the Extent can be calculated by multiplying BlockSize by NumberOfBlocks.                                                                                                    |
| ConsumableBlocks         | uint64   |                        | Describes the maximum number of blocks, of size BlockSize, that are available for consumption when layering StorageExtents using the BasedOn association.<br><br>The value for IBMTSESS_Volume is 0.                                                                                                 |
| DataRedundancy           | uint64   |                        | Describes the number of complete copies of data maintained.<br><br>The value for IBMTSESS_Volume is 1.                                                                                                                                                                                               |

Table 27. IBMTSESS\_Volume class properties (continued)

| Property                      | Type     | Qualifier or Parameter | Description                                                                                                                                                                                                    |
|-------------------------------|----------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DeltaReservation              | uint16   |                        | Describes the current value for Delta reservation.<br><br>The value for IBMTSESS_Volume is 100.                                                                                                                |
| NoSinglePointOfFailure        | Boolean  |                        | Indicates if no single point of failure exists.<br><br>The value for IBMTSESS_Volume is TRUE.                                                                                                                  |
| ExtentStatus                  | uint16[] |                        | Describes the information captured in the VolumeStatus property.<br><br>The value for IBMTSESS_Volume is 2, which means none or not applicable.                                                                |
| SequentialAccess              | Boolean  |                        | Values are:<br><br><b>TRUE</b> The Storage is sequentially accessed by a MediaAccessDevice.<br><br>The value for IBMTSESS_Volume is FALSE.                                                                     |
| IsBasedOnUnderlyingRedundancy | Boolean  |                        | Values are:<br><br><b>TRUE</b> The underlying StorageExtents participate in a StorageRedundancyGroup.<br><br>The value for IBMTSESS_Volume is TRUE.                                                            |
| PackageRedundancy             | uint16   |                        | Describes how many physical packages can currently fail without data loss. For example, in the storage domain, this might be disk spindles.<br><br>The value for IBMTSESS_Volume is 1.                         |
| <i>CIM_StorageVolume</i>      |          |                        |                                                                                                                                                                                                                |
| NameFormat                    | uint16   |                        | Format of the Name property. ValueMap {0, 1, 2, 3, 4, 5, 6, 7, 8}, Values {Unknown, Other, VPD83NAA6, VPD83NAA5, VPD83Type2, VPD83Type1, VPD83Type0, SNVM, NodeWWN}<br><br>The value for IBMTSESS_Volume is 6. |
| <b>IBMTSESS_Volume</b>        |          |                        |                                                                                                                                                                                                                |
| Cap                           | real32   |                        | Describes the volume capacity in units of GB or cylinders.                                                                                                                                                     |
| Unit                          | String   |                        | Describes the unit of volume capacity.                                                                                                                                                                         |
| Lss                           | String   |                        | Describes the logical subsystem identifiers .                                                                                                                                                                  |
| Vs                            | String   |                        | Describes the VolumeSpace to which the volume belongs.                                                                                                                                                         |
| Format                        | String   |                        | Describes the format of the volume, that is, FB, 3390.                                                                                                                                                         |

Table 27. IBMTSESS\_Volume class properties (continued)

| Property          | Type    | Qualifier or Parameter | Description                                                                                                                                                                                                                                                 |
|-------------------|---------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Controlled        | Boolean |                        | Provides a quick interface for finding Devices with no ProtocolControllerForUnit associations to Controllers. Values are: TRUE<br><b>TRUE</b> The device is accessed by initiator.<br><b>FALSE</b> The device exists but is not accessed by any initiators. |
| SpindleRedundancy | uint16  |                        | Describes how many disk spindles can fail without data loss.<br><br>The value for IBMTSESS_Volume is 2.                                                                                                                                                     |
| Ss                | String  |                        | Describes the SS ID in 4-digits hexadecimal.                                                                                                                                                                                                                |
| Status            | String  |                        | Describes the status of the volume.                                                                                                                                                                                                                         |

Table 28. IBMTSESS\_FCPort class properties

| Property                         | Type     | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                          |
|----------------------------------|----------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>        |          |                        |                                                                                                                                                                                                                                                                                                      |
| ElementName                      | String   |                        | Enables each instance to define a user-friendly name in addition to key properties or identity data, and description information.<br><br>The value for IBMTSESS_FCPort is Port + portID.                                                                                                             |
| <i>CIM_ManagedSystemElement</i>  |          |                        |                                                                                                                                                                                                                                                                                                      |
| OperationalStatus                | uint16[] |                        | Indicates the current statuses of the element.<br><br>The value for IBMTSESS_FCPort is 2, which means OK.                                                                                                                                                                                            |
| <i>CIM_LogicalElement</i>        |          |                        |                                                                                                                                                                                                                                                                                                      |
| <i>CIM_EnabledLogicalElement</i> |          |                        |                                                                                                                                                                                                                                                                                                      |
| <i>CIM_LogicalDevice</i>         |          |                        |                                                                                                                                                                                                                                                                                                      |
| SystemCreationClassName          | String   | Key, MaxLen(256)       | Describes the CreationClassName for the scoping System.<br><br>The value for IBMTSESS_FCPort is IBMTSESS_StorageSystem.                                                                                                                                                                              |
| SystemName                       | String   | Key, MaxLen(256)       | Describes the name of the scoping System.<br><br>The value for IBMTSESS_FCPort is the ESS serial number to which this controller belongs.                                                                                                                                                            |
| CreationClassName                | String   | Key, MaxLen(256)       | Indicates the name of the class or the subclass used in the creation of an instance. When used with the other key properties of this class, this property enables all instances of this class and its subclasses to be uniquely identified.<br><br>The value for IBMTSESS_FCPort is IBMTSESS_FCPort. |

Table 28. IBMTSESS\_FCPort class properties (continued)

| Property               | Type     | Qualifier or Parameter | Description                                                                                                                                                                                                                                   |
|------------------------|----------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DeviceID               | String   | Key, MaxLen(64)        | Describes an address or other identifying information to uniquely name the LogicalDevice. In this case, it is the port number.<br><br>The value for IBMTSESS_FCPort is the port ID obtained from ESSCLI, such as 04.                          |
| <i>CIM_LogicalPort</i> |          |                        |                                                                                                                                                                                                                                               |
| UsageRestriction       | uint16   |                        | Describes that in some circumstances, a LogicalPort might be identifiable as a front end or back end port. ValueMap {0, 2, 3, 4}, Values {Unknown, Front-end only, Back-end only, Not restricted}.<br><br>The value for IBMTSESS_FCPort is 2. |
| <i>CIM_NetworkPort</i> |          |                        |                                                                                                                                                                                                                                               |
| PermanentAddress       | String   |                        | Defines the network address that is hard coded into a port.<br><br>The value of IBMTSESS_FCPort is the port worldwide name.                                                                                                                   |
| NetworkAddresses       | String[] |                        | An array of strings indicating the network addresses for the port.<br><br>The value for IBMTSESS_FCPort is the last 6 digits of the port worldwide name.                                                                                      |
| PortType               | uint16   |                        | Indicates the port is a Fibre Channel Node Port capable of supporting Fibre Channel Arbitrated Loop.<br><br>The value of IBMTSESS_FCPort is 11.                                                                                               |
| Speed                  | uint64   |                        | Describes the estimate of the current bandwidth in bits per second (bps).<br><br>The value for IBMTSESS_FCPort is 16000000000 bps.                                                                                                            |
| <i>CIM_FCPort</i>      |          |                        |                                                                                                                                                                                                                                               |
| <b>IBMTSESS_FCPort</b> |          |                        |                                                                                                                                                                                                                                               |
| Loc                    | String   |                        | Describes the physical location of the port on the ESS, including Bay A, Adapter Y and Port Z.                                                                                                                                                |
| Topology               | String   |                        |                                                                                                                                                                                                                                               |
| Wwn                    | String   |                        | Describes the port worldwide name.                                                                                                                                                                                                            |
| Type                   | String   |                        | Describes the adapter type.                                                                                                                                                                                                                   |

Table 29. IBMTSESS\_SCSIProtocolController class properties

| Property                  | Type   | Qualifier or Parameter | Description                                                                                                                                                                                          |
|---------------------------|--------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i> |        |                        |                                                                                                                                                                                                      |
| ElementName               | String |                        | Allows each instance to define a user-friendly name in addition to its key properties/identity data and description information.<br><br>The value for IBMTSESS_SCSIProtocolController is Controller. |

Table 29. IBMTSESS\_SCSIProtocolController class properties (continued)

| Property                               | Type     | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------|----------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedSystemElement</i>        |          |                        |                                                                                                                                                                                                                                                                                                                                             |
| OperationalStatus                      | uint16[] |                        | Indicates the current status(es) of the element.<br><br>The value for IBMTSESS_SCSIProtocolController is 2, which means "OK".                                                                                                                                                                                                               |
| <i>CIM_LogicalElement</i>              |          |                        |                                                                                                                                                                                                                                                                                                                                             |
| <i>CIM_EnabledLogicalElement</i>       |          |                        |                                                                                                                                                                                                                                                                                                                                             |
| <i>CIM_LogicalDevice</i>               |          |                        |                                                                                                                                                                                                                                                                                                                                             |
| SystemCreationClassName                | String   | Key, MaxLen(256)       | Describes the scoping System's CreationClassName.<br><br>The value for IBMTSESS_SCSIProtocolController is IBMTSESS_StorageSystem.                                                                                                                                                                                                           |
| SystemName                             | String   | Key, MaxLen(256)       | Describes the scoping System's Name.<br><br>The value for IBMTSESS_SCSIProtocolController is the ESS serial number.                                                                                                                                                                                                                         |
| CreationClassName                      | String   | Key, MaxLen(256)       | Indicates the name of the class or the subclass that is used in the creation of an instance. When used with the other key properties of this class, this property allows all instances of this class and its subclasses to be uniquely identified.<br><br>The value for IBMTSESS_SCSIProtocolController is IBMTSESS_SCSIProtocolController. |
| DeviceID                               | String   | Key, MaxLen(64)        | The value for IBMTSESS_SCSIProtocolController is initiatorID.                                                                                                                                                                                                                                                                               |
| <i>CIM_ProtocolController</i>          |          |                        |                                                                                                                                                                                                                                                                                                                                             |
| MaxUnitsControlled                     | uint32   |                        | Describes the maximum number of units that can be controlled by or accessed through this protocol controller.<br><br>The value for IBMTSESS_SCSIProtocolController is 0.                                                                                                                                                                    |
| <i>CIM_SCSIProtocolController</i>      |          |                        |                                                                                                                                                                                                                                                                                                                                             |
| <i>IBMTSESS_SCSIProtocolController</i> |          |                        |                                                                                                                                                                                                                                                                                                                                             |
| ProtocolSupported                      | uint64   |                        | The value for IBMTSESS_SCSIProtocolController is 2.                                                                                                                                                                                                                                                                                         |

Table 30. IBMTSESS\_Privilege class properties

| Property                  | Type   | Qualifier or Parameter | Description                                                                                                                                                                            |
|---------------------------|--------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i> |        |                        |                                                                                                                                                                                        |
| ElementName               | String |                        | Allows each instance to define a user-friendly name in addition to its key properties or identity data and description information.<br><br>The value for IBMTSESS_Privilege is initID. |

Table 30. IBMTSESS\_Privilege class properties (continued)

| Property                  | Type    | Qualifier or Parameter | Description                                                                                                                                                                              |
|---------------------------|---------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_Privilege</i>      |         |                        |                                                                                                                                                                                          |
| InstanceID                | String  | Key                    | Identifies a unique instance of Privilege.<br><br>The value for IBMTSESS_Privilege is ESS serial number-initID.                                                                          |
| PrivilegeGranted          | Boolean |                        | Indicating whether this Privilege grants or denies permission.<br><br><b>TRUE</b> Grants permission.<br><b>FALSE</b> Denies permission.<br><br>The value for IBMTSESS_Privilege is TRUE. |
| <i>IBMTSESS_Privilege</i> |         |                        |                                                                                                                                                                                          |

Table 31. IBMTSESS\_StorageHardwareID class properties

| Property                     | Type    | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                               |
|------------------------------|---------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>    |         |                        |                                                                                                                                                                                                                                                                                                                           |
| ElementName                  | String  |                        | Allows each instance to define a user-friendly name in addition to its key properties/identity data. It also provides description information.<br><br>The value for IBMTSESS_StorageHardwareID is the host name.                                                                                                          |
| <i>CIM_Identity</i>          |         |                        |                                                                                                                                                                                                                                                                                                                           |
| InstanceID                   | String  | Key                    | Identifies a unique instance of Identity.<br><br>The value for IBMTSESS_StorageHardwareID is ESS serial number-initID.                                                                                                                                                                                                    |
| CurrentlyAuthenticated       | Boolean |                        | Indicates whether this Identity has been authenticated, and is currently known within the scope of an AuthenticationService or authority.<br><br><b>TRUE</b> The authenticity should be assumed.<br><b>FALSE</b> The authenticity <i>should not</i> be assumed.<br><br>The value for IBMTSESS_StorageHarewareID is FALSE. |
| <i>CIM_StorageHardwareID</i> |         |                        |                                                                                                                                                                                                                                                                                                                           |
| StorageID                    | String  |                        | Provides the hardware worldwide unique ID. The value for IBMTSESS_StorageHardwareID will be initiator ID.                                                                                                                                                                                                                 |

Table 31. IBMTSESS\_StorageHardwareID class properties (continued)

| Property                          | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                       |
|-----------------------------------|--------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IDType                            | uint16 |                        | Provides the type of the ID property.<br>ValueMap {1, 2, 3, 4}, Values {Other, PortWWN, NodeWWN, Hostname}<br><br>The value for IBMTSESS_StorageHardwareID is 2.                                                                                                                  |
| <i>IBMTSESS_StorageHardwareID</i> |        |                        |                                                                                                                                                                                                                                                                                   |
| profile                           | uint16 |                        | Defines the platform or operating system type associated with the host.<br>ValueMap{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15} Values {aix, dgux, dynix, hpux, irix, iscsigate, linux, linuxppc, linux390, netware, nt4, openvms, os400, solaris251, solaris26, tru64} |

Table 32. IBMTSESS\_StorageConfigurationService class properties

| Property                         | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------|--------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>        |        |                        |                                                                                                                                                                                                                                                                                                                                                |
| ElementName                      | String |                        | This property enables each instance to define a user-friendly name in addition to its key properties or identity data, and description information.<br><br>The value for IBMTSESS_StorageConfigurationService is StorageConfigurationService.                                                                                                  |
| <i>CIM_ManagedSystemElement</i>  |        |                        |                                                                                                                                                                                                                                                                                                                                                |
| <i>CIM_LogicalElement</i>        |        |                        |                                                                                                                                                                                                                                                                                                                                                |
| <i>CIM_EnabledLogicalElement</i> |        |                        |                                                                                                                                                                                                                                                                                                                                                |
| <i>CIM_Service</i>               |        |                        |                                                                                                                                                                                                                                                                                                                                                |
| SystemCreationClassName          | String | Key, MaxLen(256)       | Describes the CreationClassName for the scoping System.<br><br>The value for IBMTSESS_StorageConfigurationService is IBMTSESS_StorageSystem.                                                                                                                                                                                                   |
| SystemName                       | String | Key, MaxLen(256)       | Describes the name of the scoping System.<br><br>The value for IBMTSESS_StorageConfigurationService is the ESS serial number.                                                                                                                                                                                                                  |
| CreationClassName                | String | Key, MaxLen(256)       | Indicates the name of the class or the subclass used in the creation of an instance. When used with the other key properties of this class, this property enables all instances of this class and its subclasses to be uniquely identified.<br><br>The value for IBMTSESS_StorageConfigurationService is IBMTSESS_StorageConfigurationService. |

Table 32. IBMTSESS\_StorageConfigurationService class properties (continued)

| Property                                    | Type   | Qualifier or Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name                                        | String | Key, MaxLen(64)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Describes an address or other identifying information to uniquely name the LogicalElement.<br><br>The value for IBMTSESS_Storage ConfigurationService is ConfigService.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <i>StorageConfigurationService</i>          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>IBMTSESS_StorageConfigurationService</b> |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| CreateOrModifyElementFromStoragePool()      | UInt32 | [IN, Description(Not Supported.)) String ElementName, [IN, Description(Enumeration indicating the type of element being created or modified. If the input parameter Element is specified (for the case of modify), this type value must match the type of that instance.)) UInt 16 ElementType, [OUT, IN(false), Description(Not Supported.)) CIM_ConcreteJob ref Job, [IN, Description(The requirements for the element to maintain. If set to a null value, the default configuration from the source pool will be used.)) CIM_StorageSetting ref Goal, [IN, OUT, Description(As an input parameter Size specifies the desired size in Bytes. As an output parameter Size specifies the size achieved.)) UInt64 Size, [In, Description(The Pool to create the Element from. This parameter must be set to null if the input parameter Element is specified (in the case for modify)) IBMTSESS_VolumeSpace ref InPool, [IN, OUT, Description(As an input parameter: if null create a new element. If not null, then modify the specified element. Returned parameter is a reference to the resulting element.)) IBMTSESS_Volume ref TheElement. | Start a job to create (or modify) a specified element (for example, a volume) from a StoragePool. Description of return values:<br><br><b>0</b> Success<br><b>1</b> Not Supported<br><b>4</b> Failed (Result might be intermittent. You might need to investigate it.)<br><b>0x1001</b> Input Size is bigger than the free spaces left in the InPool<br><b>0x8000</b> Authorization failure<br><b>0x8002</b> Invalid parameter Goal<br><b>0x8004</b> Input Size is invalid, either less than or equal to 0, or is null<br><b>0x8005</b> Invalid parameter InPool<br><b>0x8010</b> ElementType should be 2 meaning "StorageVolume"<br><b>0x8020</b> IBMTSESS does not support modification of volumes.<br><b>0x8021</b> IBMTSESS cannot create the volume as specified (ESS CLI cannot "create volume" as specified)<br><b>0x8022</b> The LSS already contains maximum number of volumes.<br><b>0x8023</b> Insufficient volume addresses in the given logical subsystems.<br><b>0x8030</b> Creating indication failure. |



Table 32. IBMTSESS\_StorageConfigurationService class properties (continued)

| Property                  | Type   | Qualifier or Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CreateOrModifyStoragePool | uint32 | [IN, Description (Not Supported.)] String ElementName, [OUT, Description(Not Supported.)] CIM_ConcreteJob REF Job, [IN, Description(Reference to an instance of StorageSetting that defines the desired capabilities of the StoragePool. If set to a null value, the default configuration from the source pool will be used. If not NULL, this parameter will supply a new Goal setting when modifying an existing pool.)] CIM_StorageSetting REF Goal, [IN, OUT, Description(As an input parameter this specifies the desired pool size in bytes. As an output parameter this specifies the size achieved.), Units ("Bytes")] uint64 Size, [IN, Description Array of strings containing representations of references to IBMTSESS_PrimordialStoragePool instances, that are used to create the Pool or modify the source pools.)] string InPools[], [IN, Description (Array of strings containing representations of references to IBMTSESS_StorageExtent instances, that are used to create the Pool or modify the source extents.)] string InExtents[], [IN, OUT, Description (As an input parameter: if null, creates a new StoragePool. else modifies the storagePool.)] IBMTSESS_VolumeSpace REF Pool, [IN, Description(As an input parameter: It specifies the ESS logical volume type. If null, a new StoragePool with Format as FB will be created. If not null, the a new StoragePool with specified Format will be created. The possible value of VolType will be 3380, 3390, or FB )] string VolType, [IN, Description(As an input parameter: It specifies the LSS where the volumespace will be created. LssNum is unavoidable if the VolType is either 3380 or 3390. The LssNum is in decimal: 0 to 21 (from 0x00 to 0x15). )] uint16 LssNum. | <p>Create a pool of storage with a set of StorageCapabilites defined by the input StorageSetting. The source of the storage can be other pools or storage extents. Description of return values:</p> <p><b>0</b> Success</p> <p><b>4</b> Failed (Result might be intermittent. You may need to look into it.)</p> <p><b>0x1002</b> Size is not supported</p> <p><b>0x8002</b> Invalid Goal</p> <p><b>0x8004</b> Invalid Size (Size is equal to or less than 0)</p> <p><b>0x8005</b> Invalid InPools</p> <p><b>0x8007</b> Either InPools or InExtents should be defined, but not both.</p> <p><b>0x8008</b> Invalid VolType</p> <p><b>0x8009</b> Invalid LssNum</p> <p><b>0x8020</b> IBMTSESS doesn not support modification of volumespace</p> <p><b>0x8021</b> IBMTSESS cannot create volumespace as specified</p> <p><b>0x8030</b> Creating indication failure</p> |

Table 32. IBMTSESS\_StorageConfigurationService class properties (continued)

| Property              | Type   | Qualifier or Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DeleteStoragePool     | uint32 | [OUT, IN(false), Description("Not Supported.")] CIM_ConcreteJob REF Job, [IN, Description(Reference to the pool to delete.))] IBMTSESS_VolumeSpace REF Pool                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Delete a storage pool. Description of return value:<br><br><b>0</b> Success<br><b>0x8005</b> Invalid VolumeSpace<br><b>0x8021</b> IBMTSESS cannot delete storage pool as specified                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| ModifySynchronization | uint32 | [IN, Description(Operation describes the type of modification to be made to the replica.), ValueMap {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, ..., 0x8000..0xFFFF}, Values {DMTF Reserved", DMTF Reserved, Detach, Fracture, Resync Replica, Restore from Replica, Prepare, Unprepare, Quiesce, Unquiesce, Reset To Sync, Reset To Async, DMTF Reserved, Vendor Specific}] uint16 Operation, [OUT, IN(false), Description(Reference to the job (may be null if the task completed). Not Supported. ) CIM_ConcreteJob REF Job, [IN, Description(The referenced to the StorageSynchronized association describing the storage source/replica relationship.))]IBMTSESS_StorageSynchronized REF Synchronization, [IN, Description(A client can specify with the ModifySynchronization method.), ValueMap {50202, 40203, 50203, 20203, 30203, 20304, 30304, 40407}, Values {InitiateBackgroundCopy, IssueTarget, IssueSource, IssueSource, IssueSource, IssueSource, InitiateBackgroundCopy}} uint16 Options[], [IN, Description(It is either IBMTSESS_RemoteSourceStorage Synchronized or IBMTSESS_TargetSourceStorage Synchronized. If Synchronization is not null, then RemoteSynchronization must be null.))] [IN, Description(It allows the user to set DetachPath after Detach operation. The default value is TRUE, meaning DetachPath will be executed after Detach Operation))]boolean DetachPath. CIM_ManagedElement REF RemoteSynchronization. | Starts a job to modify the synchronization association between two storage objects. Description of return code:<br><br><b>0</b> Success<br><b>0x8010</b> Could not retrieve internal Service<br><b>0x8011</b> Could not retrieve internal volume IDs<br><b>0x8012</b> Could not connect to internal services<br><b>0x8013</b> Invalid Operation<br><b>0x8016</b> Current copyType doesn't provide specified option under given operation<br><b>0x8017</b> Specified operation does not provide the given option<br><b>0x8018</b> Can't request both InitiateBackgroundCopy and IssueTarget at the same time<br><b>0x8020</b> SourceVolume is already a TargetElement in other StorageSynchronized relationship<br><b>0x8024</b> Invalid option<br><b>0x8025</b> Invalid combination of options<br><b>0x8030</b> Invalid parameter |

Table 32. IBMTSESS\_StorageConfigurationService class properties (continued)

| Property    | Type   | Qualifier or Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AttachPaths | uint32 | [IN, Description (A path (IBMTSESS_PPRCPath) has a type. It can be either ESCON or FCP. Only one type can be added to associate to IBMTSESS_VolumeSpace)] uint16 Type, [IN, Description(ObjectPath reference to an ESS VolumeSpace representing a source logical subsystem from which one or more paths are to be defined.) ] IBMTSESS_VolumeSpace REF Source, [IN, Description(ObjectPath reference to an ESS VolumeSpace representing the target logical subsystem to which one or more paths are to be defined.))] IBMTSESS_VolumeSpace REF Target, [IN, Description ("Number of paths to define") ] uint16 Number, [IN, Description(An array of the following options: ConsistencyGroup, ForceReplace SuspendAfterCreate and ForceIfPairsExist. All default values are No), ValueMap {1, 2}, Values {ConsistencyGroup, ForceReplace} ] uint16 Options]] [IN, Description( "LSS Number of LSS on target ESS" "This parameter is optional. It can be specified if the target ESS is not managed by ICAT ") ] String TargetLSSNumber, [IN, Description( "SSID for the LSS on the target ESS, in hexadecimal ranging from 0x0001 through 0xFEFF" "This parameter is optional. It can be specified if the target ESS is not managed by ICAT") ] String TargetSSID, [IN, Description( "ESS Sequence (5 to 12-character alphanumeric string, right-justified with leading zeroes removed. ex. 21975)" "This parameter is optional. It can be specified if the target ESS is not managed by ICAT") ] String TargetESSSequenceNumber). | <p>AttachPaths enables the creation of ESS paths between logical subsystems. A logical subsystem (LSS) is represented by an instance of IBMTSESS_VolumeSpace. The AttachPaths method creates one or more ESS Path associations between one VolumeSpace and another. A path is represented by an instance of IBMTSESS_PPRCPath. Description of the return code:</p> <p><b>0</b> Success</p> <p><b>4</b> Failed (Result might be intermittent.You may need to look into it.)</p> <p><b>5</b> Invalid parameter</p> <p><b>0x8014</b> Synchronization Or RemoteSynchronization does NOT exist</p> <p><b>0x8021</b> Could not get Candidate Connections (Connection Array is empty)</p> |

Table 32. IBMTSESS\_StorageConfigurationService class properties (continued)

| Property    | Type   | Qualifier or Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Description                                                                                                                                                                                                    |
|-------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DetachPaths | uint32 | [IN, Description(The type of path to remove), ValueMap {0, 1}, Values {ESCON, FCP} ] uint16 Type, [IN, Description(ObjectPath reference to an ESS VolumeSpace representing a source logical subsystem from which one or more paths are to be removed.)) IBMTSESS_VolumeSpace REF Source, [IN, Description(ObjectPath reference to an ESS VolumeSpace representing the target logical subsystem from which one or more paths are to be removed.)) IBMTSESS_VolumeSpace REF Target, [IN, Description(Options: ForceIfPairsExist. All default values are No), ValueMap {1}, Values {ForceIfPairsExist} ]uint16 Options[] [IN, Description( "LSS Number of LSS on target ESS" "This parameter is optional. It can be specified if the target ESS is not managed by ICAT ") ] String TargetLSSNumber, [IN, Description( "SSID for the LSS on the target ESS, in hexadecimal ranging from 0x0001 through 0xFEFF" "This parameter is optional. It can be specified if the target ESS is not managed by ICAT") ] String TargetSSID, [IN, Description( "ESS Sequence (5 to 12-character alphanumeric string, right-justified with leading zeroes removed. ex. 21975)" "This parameter is optional. It can be specified if the target ESS is not managed by ICAT") ] String TargetESSSequenceNumber). | DetachPaths removes all path associations represented by IBMTSESS_PPRCPath that exist between two IBMTSESS_VolumeSpaces. Description of the return code:<br><br><b>0</b> Success<br><b>5</b> Invalid parameter |

Table 32. IBMTSESS\_StorageConfigurationService class properties (continued)

| Property       | Type   | Qualifier or Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AttachReplica  | uint32 | [OUT, IN(false)]<br>CIM_ConcreteJob REF Job, [IN, Required, Description(The source storage object which may be a StorageVolume or other storage object) ]<br>IBMTSESS_Volume REF SourceElement, [IN, Description("Reference to the target storage element.")]<br>IBMTSESS_Volume REF TargetElement, [IN, Description(CopyType describes the type of Synchronized relationship that will be created.), ValueMap {2, 3, 4, 5, ..., 0x8000..0xFFFF}, Values {Async, Sync, UnSyncAssoc, UnSyncUnAssoc, DMTF Reserved, Vendor Specific} ] uint16 CopyType                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Create a StorageSynchronized relationship between two existing storage objects. Description of the return code:<br><br><b>0</b> Success<br><b>5</b> Invalid Parameter<br><b>0x8011</b> Could not retrieve internal VolumeID from CIM Volume Object<br><b>0x8021</b> Failed to establish PPRC path                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| AttachReplicas | uint32 | [OUT, IN(false)]<br>CIM_ConcreteJob REF Job, [IN, Description(A end user relevant name for the element being created. If NULL then a system supplied default name can be used. The value will be stored in 'ElementName' property for the created element.)] string ElementName, [IN, Required, Description("The source storage object references which may be StorageVolumes or other storage objects) ] string SourceElement[], [IN, Description(Reference to the target storage elements.)] string TargetElement[], [IN, Description(CopyType describes the type of Synchronized relationship that will be created.), ValueMap {2, 3, 4, 5, ..., 0x8000..0xFFFF}, Values {Async, Sync, UnSyncAssoc, UnSyncUnAssoc, DMTF Reserved, Vendor Specific} ] uint16 CopyType, [IN, Description(Options describes the ESS-specific options for creating StorageSynchronized association.)] uint16 Options[] [IN, Description (Check if PPRC Paths exist, if not, create them. Default is TRUE.) ] boolean CreatePaths, [OUT, Description Array of returned code status of attached replicas) ] string internal Results[] | Create (or start a job to create) a StorageSynchronized relationship between two existing storage objects. Description of the return code:<br><br><b>0</b> Success<br><b>5</b> Invalid Parameter<br><b>0x8010</b> Could not retrieve internal service<br><b>0x8011</b> Could not retrieve internal volume IDs<br><b>0x8012</b> Could not connect to internal services<br><b>0x8015</b> Current copyType does not provide specified option under given operation<br><b>0x8020</b> SourceVolume is already a TargetElement in other StorageSynchronized relationship<br><b>0x8021</b> Failed to establish PPRC path<br><b>0x8024</b> Invalid option<br><b>0x8025</b> Invalid combinaton of options<br><b>0x8030</b> Invalid parameter |

Table 32. IBMTSESS\_StorageConfigurationService class properties (continued)

| Property               | Type   | Qualifier or Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Description                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FreezeConsistencyGroup | uint32 | [IN, Description (Array of strings containing representations of references to IBMTSESS_VolumeSpace instances, Each element must have a 1-1 relationship with the target parameter.) ]string Sources[], [IN, Description (Array of strings containing representations of references to IBMTSESS_VolumeSpace instances, Each element must have a 1-1 relationship with the source parameter.) ]string Targets[] [IN, Description (Array of strings containing ssIDs used to create the internal LSSIDs for the remote target volumespaces, the number of targets and targetSSIDs must be the same.) ] string targetSSIDs[] [IN, Description ("Array of strings containing LSSes used to create the internal LSSIDs for the remote target volumespaces, the number of targets and targetLSSs must be the same.) ]string targetLSSs[] | FreezeConsistencyGroup stops all I/O to source and target volume pairs for the given source and target VolumeSpaces. Description of return code:<br><br><b>0</b> Success<br><b>0x8010</b> Could not retrieve internal service<br><b>0x8012</b> Could not connect to internal services<br><b>0x8003</b> Could not retrieve instance<br><b>0x8005</b> Invalid Sources or Targets<br><b>0x8030</b> Invalid parameter           |
| ThawConsistencyGroup   | uint32 | [IN, Description (Array of strings containing representations of references to IBMTSESS_VolumeSpaces instances, Each element must have a 1-1 relationship with the target parameter.) ] string Sources[], [IN, Description (Array of strings containing representations of references to IBMTSESS_VolumeSpaces instances, Each element must have a 1-1 relationship with the source parameter.) ] string Targets[] [IN, Description (Array of strings containing ssIDs used to create the NILSSIDs for the remote target volumespaces, the number of targets and targetSSIDs must be the same.) ] string targetSSIDs[],[IN, Description (Array of strings containing LSSes used to create the NILSSIDs for the remote target volumespaces, the number of targets and targetLSSs must be the same.) ] string targetLSSs[]           | ThawConsistencyGroup un-does the freeze and enables I/O to be again performed on the given source and target VolumeSpaces. Description of the return code.<br><br><b>0</b> Success<br><b>0x8003</b> Could not retrieve instance<br><b>0x8005</b> Invalid Sources or Targets<br><b>0x8010</b> Could not retrieve internal service<br><b>0x8012</b> Could not connect to internal services<br><b>0x8030</b> Invalid Parameter |

Table 32. IBMTSESS\_StorageConfigurationService class properties (continued)

| Property                       | Type | Qualifier or Parameter                                                                                                                                                                                                                                                                                                                                                                             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| queryConsistencyGroupSetting() |      | [Description (Method queryConsistencyGroupSetting allows application to query for the current PPRC/FlashCopy Consistency Group settings)] uint32 queryConsistencyGroupSetting ([IN, Description (Logical Subsystem for which attributes should be queried)] string LSSID, [OUT, Description (Number of seconds for the PPRC ConsistencyGroup timeout (Maximum of 600000 seconds))] uint16 Timeout) | <b>0x8010</b> Could not retrieve internal service<br><b>0x8012</b> Could not connect to internal services<br><b>0x8013</b> Could not retrieve to internal CopyCommonService<br><b>0x8014</b> Could not retrieve internal LSSID instance<br><b>0x8015</b> Could not create an internal LSSID instance<br><b>0x8017</b> Could not retrieve internal ConsistencyGroupAttribute                                                                          |
| setConsistencyGroupSetting()   |      | [Description (Method setConsistencyGroupAttribute allows the application to replace the current Consistency Group Attributes)] uint32 setConsistencyGroupSetting ([IN, Description (Logical Subsystem for which attributes should be set)] string LSSID, [IN, Description (Number of seconds for the PPRC ConsistencyGroup timeout (Maximum of 600000 seconds))] uint16 Timeout);                  | <b>0</b> Success<br><b>0x8010</b> Could not retrieve internal service<br><b>0x8012</b> Could not connect to internal services<br><b>0x8013</b> Could not retrieve to internal CopyCommonService<br><b>0x8014</b> Could not retrieve internal LSSID instance<br><b>0x8015</b> Could not create an internal LSSID instance<br><b>0x8017</b> Could not retrieve internal ConsistencyGroupAttribute<br><b>0x8030</b> setConsistencyGroupSetting() failed |

Table 33. IBMTSESS\_LunMaskPrivilegeService class properties

| Property                         | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                                          |
|----------------------------------|--------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>        |        |                        |                                                                                                                                                                                                                                      |
| ElementName                      | String |                        | This property allows each instance to define a user-friendly name in addition to its key properties and identity data and description information.<br><br>The value for IBMTSESS_LunMaskPrivilegeService is LunMaskPrivilegeService. |
| <i>CIM_ManagedSystemElement</i>  |        |                        |                                                                                                                                                                                                                                      |
| <i>CIM_LogicalElement</i>        |        |                        |                                                                                                                                                                                                                                      |
| <i>CIM_EnabledLogicalElement</i> |        |                        |                                                                                                                                                                                                                                      |
| <i>CIM_Service</i>               |        |                        |                                                                                                                                                                                                                                      |
| SystemCreationClassName          | String | Key, MaxLen(256)       | Describes the scoping system's CreationClassName.<br><br>The value for IBMTSESS_LunMaskPrivilegeService is IBMTSESS_StorageSystem.                                                                                                   |

| Table 33. IBMTSESS\_LunMaskPrivilegeService class properties (continued)

| Property                         | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                           |
|----------------------------------|--------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SystemName                       | String | Key, MaxLen(256)       | Describes the scoping System's Name.<br><br>The value for IBMTSESS_LunMaskPrivilegeService is ESS serial number.                                                                                                                                                                                                                      |
| CreationClassName                | String | Key, MaxLen(256)       | Indicates the name of the class or the subclass used in the creation of an instance. When used with the other key properties of this class, this property allows all instances of this class and its subclasses to be uniquely identified. The value<br><br>for IBMTSESS_LunMaskPrivilegeService is IBMTSESS_LunMaskPrivilegeService. |
| Name                             | String | Key, MaxLen(64)        | Describes an address or other identifying information to uniquely name the LogicalElement.<br><br>The value for IBMTSESS_LunMaskPrivilegeService is LunMaskPrivilegeService.                                                                                                                                                          |
| CIM_SecurityService              |        |                        |                                                                                                                                                                                                                                                                                                                                       |
| CIM_AuthorizationService         |        |                        |                                                                                                                                                                                                                                                                                                                                       |
| CIM_PrivilegeManagementService   |        |                        |                                                                                                                                                                                                                                                                                                                                       |
| IBMTSESS_LunMaskPrivilegeService |        |                        |                                                                                                                                                                                                                                                                                                                                       |



Table 33. IBMTSESS\_LunMaskPrivilegeService class properties (continued)

| Property       | Type   | Qualifier or Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AssignAccess() | uint32 | [IN]<br>CIM_ManagedElement<br>Ref Subject, [IN]<br>boolean<br>PrivilegeGranted, [IN,<br>Description ("The<br>activities granted in the<br>new Privilege."),<br>ArrayType ("Indexed"),<br>Values {0, 1, 2, 3, 4, 5, 6,<br>7, 8..15999, 16000, ..},<br>ValueMap {Other,<br>Create, Delete, Detect,<br>Read, Write, Execute,<br>DMTF Reserved, Vendor<br>Reserved}] uint16<br>Activities[], [IN,<br>Description (The<br>activity qualifiers<br>set in the new<br>Privilege.)) string<br>ActivityQualifiers[], [IN,<br>Description (The<br>qualifier formats set<br>in the new Privilege.<br>)] uint16<br>QualifierFormats[], [IN]<br>CIM_ManagedElement<br>Ref Target, [IN, OUT,<br>Description(Reference<br>to the new Privilege.)] | Creates a<br>IBMTSESS_AccessControllInformation, and it<br>is linked via an AuthorizationSubject<br>association to IBMTSESS_HardwareAccount,<br>and via AuthorizationTarget association to<br>Controller, and is associated to<br>AuthorizationService via AuthorizedUse.<br>Description of return values:<br><br><b>0</b> Success<br><b>1</b> Not Supported<br><b>4</b> Failed (Result might be intermittent.<br>You may need to look into it.)<br><b>5</b> Missing required property within<br>Subject or Target<br><br><b>0x8000</b> Authorization Failure<br><b>0x8001</b> Invalid parameter Subject<br><b>0x8003</b> Invalid parameter Target<br><b>0x8010</b> Support Single Target only<br><b>0x8020</b> IBMTSESS cannot AssignAccess as<br>specified (ESS CLI cannot create or<br>set hostconnection.)<br><b>0x8021</b> Controller processing fails<br><b>0x8022</b> HardwareAccount processing fails<br><b>0x8030</b> Creating indication failure |

Table 33. IBMTSESS\_LunMaskPrivilegeService class properties (continued)

| Property       | Type   | Qualifier or Parameter                                                                                                      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------|--------|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RemoveAccess() | uint32 | [IN]<br>CIM_ManagedElement<br>REF Subject, [IN]<br>CIM_Privilege REF<br>Privilege, [IN]<br>CIM_ManagedElement<br>REF Target | Deletes the the associated AuthorizedSubject instances for the named subjects. Description of return values:<br><br><b>0</b> Success<br><b>1</b> Not Supported<br><b>4</b> Failed (Result might be intermittent. You may need to look into it)<br><b>0x8000</b> Authorization failure<br><b>0x8001</b> Invalid parameter Subject<br><b>0x8003</b> Invalid parameter Target<br><b>0x8004</b> Access not assigned yet<br><b>0x8005</b> The specified Subject and Target are not associated<br><b>0x8010</b> Support Single Target only<br><b>0x8011</b> Should DetachDevice first<br><b>0x8020</b> IBMTSESS cannot RemoveAccess as specified (ESS CLI cannot delete or set hostconnection, as specified.)<br><b>0x8021</b> Controller processing fails<br><b>0x8022</b> HardwareAccount processing fails<br><b>0x8030</b> Creating indication failure |

Table 34. IBMTSESS\_StorageHardwareIDManagementService class properties

| Property                         | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                                              |
|----------------------------------|--------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>        |        |                        |                                                                                                                                                                                                                                          |
| ElementName                      | String |                        | Allows each instance to define a user-friendly name in addition to its key properties/identity data and description information.<br><br>The value for IBMTSESS_StorageHardwareIDManagementService is StorageHardwareIDManagementService. |
| <i>CIM_ManagedSystemElement</i>  |        |                        |                                                                                                                                                                                                                                          |
| <i>CIM_LogicalElement</i>        |        |                        |                                                                                                                                                                                                                                          |
| <i>CIM_EnabledLogicalElement</i> |        |                        |                                                                                                                                                                                                                                          |
| <i>CIM_Service</i>               |        |                        |                                                                                                                                                                                                                                          |
| SystemCreationClassName          | String | Key, MaxLen(256)       | Describes the scoping System's CreationClassName.<br><br>The value for IBMTSESS_StorageHardwareIDManagementService is IBMTSESS_StorageSystem.                                                                                            |

Table 34. IBMTSESS\_StorageHardwareIDManagementService class properties (continued)

| Property                                           | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------------|--------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SystemName                                         | String | Key, MaxLen(256)       | Describes the scoping System's Name.<br><br>The value for IBMTSESS_StorageHardwareIDManagementService is ESS serial number.                                                                                                                                                                                                                                  |
| CreationClassName                                  | String | Key, MaxLen(256)       | Indicates the name of the class or the subclass used in the creation of an instance. When used with the other key properties of this class, this property allows all instances of this class and its subclasses to be uniquely identified.<br><br>The value for IBMTSESS_StorageHardwareIDManagementService is "IBMTSESS_StorageHardwareIDManagementService. |
| Name                                               | String | Key, MaxLen(64)        | Describes an address or other identifying information to uniquely name the LogicalElement.<br><br>The value for IBMTSESS_StorageHardwareIDManagementService is StorageHardwareIDManagementService.                                                                                                                                                           |
| <i>CIM_SecurityService</i>                         |        |                        |                                                                                                                                                                                                                                                                                                                                                              |
| <i>CIM_AuthenticationService</i>                   |        |                        |                                                                                                                                                                                                                                                                                                                                                              |
| <i>CIM_StorageHardwareIDManagementService</i>      |        |                        |                                                                                                                                                                                                                                                                                                                                                              |
| <i>IBMTSESS_StorageHardwareIDManagementService</i> |        |                        |                                                                                                                                                                                                                                                                                                                                                              |

Table 35. IBMTSESS\_Product class properties

| Property                  | Type   | Qualifier or Parameter | Description                                                                                                                                                                                               |
|---------------------------|--------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i> |        |                        |                                                                                                                                                                                                           |
| ElementName               | String |                        | Enables each instance to define a user-friendly name in addition to its key properties or identity data, and description information.<br><br>The value for IBMTSESS_Product is IBM Product + its version. |
| <i>CIM_Product</i>        |        |                        |                                                                                                                                                                                                           |
| Name                      | String | Key                    | Commonly used product name.<br><br>The value for IBMTSESS_Product is IBM TotalStorage Enterprise Storage Server (ESS).                                                                                    |
| IdentifyingNumber         | String | Key                    | Product identification such as a serial number on software.<br><br>The value for IBMTSESS_Product is the ESS serial number.                                                                               |
| Vendor                    | String | Key                    | The name of the supplier of the Product.<br><br>The value for IBMTSESS_Product is IBM.                                                                                                                    |

Table 35. IBMTSESS\_Product class properties (continued)

| Property                | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                   |
|-------------------------|--------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Version                 | String | Key                    | Product version information.<br><br>The value for IBMTSESS_Product is the codelevel obtained from the output report that is generated by the <b>ESSCLI</b> command, with the list server parameter specified. |
| <b>IBMTSESS_Product</b> |        |                        |                                                                                                                                                                                                               |

Table 36. IBMTSESS\_AllocatedFromStoragePool class properties

| Property                                 | Type                 | Qualifier or Parameter | Description                                    |
|------------------------------------------|----------------------|------------------------|------------------------------------------------|
| <i>CIM_Dependency</i>                    |                      |                        |                                                |
| <i>CIM_AllocatedFromStoragePool</i>      |                      |                        |                                                |
| <b>IBMTSESS_AllocatedFromStoragePool</b> |                      |                        |                                                |
| Antecedent (override)                    | IBMTSESS_VolumeSpace | Key                    | StoragePool                                    |
| Dependent (override)                     | IBMTSESS_Volume      | Key                    | Subsidiary element                             |
| SpaceConsumed                            | uint64               |                        | Space consumed from this pool, units ("Bytes") |

Table 37. IBMTSESS\_StorageSystemToVolume class properties

| Property                              | Type                   | Qualifier or Parameter | Description                      |
|---------------------------------------|------------------------|------------------------|----------------------------------|
| <i>CIM_Component</i>                  |                        |                        |                                  |
| <i>CIM_SystemComponent</i>            |                        |                        |                                  |
| <i>CIM_SystemDevice</i>               |                        |                        |                                  |
| <b>IBMTSESS_StorageSystemToVolume</b> |                        |                        |                                  |
| GroupComponent (override)             | IBMTSESS_StorageSystem | Key                    | Parent system in the Association |
| PartComponent (override)              | IBMTSESS_Volume        | Key                    | A component of a System          |

Table 38. IBMTSESS\_StorageSystemToPort class properties

| Property                            | Type                   | Qualifier or Parameter | Description                      |
|-------------------------------------|------------------------|------------------------|----------------------------------|
| <i>CIM_Component</i>                |                        |                        |                                  |
| <i>CIM_SystemComponent</i>          |                        |                        |                                  |
| <i>CIM_SystemDevice</i>             |                        |                        |                                  |
| <b>IBMTSESS_StorageSystemToPort</b> |                        |                        |                                  |
| GroupComponent (override)           | IBMTSESS_StorageSystem | Key                    | Parent system in the Association |
| PartComponent (override)            | IBMTSESS_FCPort        | Key                    | A component of a System          |

Table 39. IBMTSESS\_StorageSystemToController class properties

| Property                                  | Type                   | Qualifier or Parameter | Description                      |
|-------------------------------------------|------------------------|------------------------|----------------------------------|
| <i>CIM_Component</i>                      |                        |                        |                                  |
| <i>CIM_SystemComponent</i>                |                        |                        |                                  |
| <i>CIM_SystemDevice</i>                   |                        |                        |                                  |
| <b>IBMTSESS_StorageSystemToController</b> |                        |                        |                                  |
| GroupComponent (override)                 | IBMTSESS_StorageSystem | Key                    | Parent system in the Association |
| PartComponent (override)                  | IBMTSESS_Controller    | Key                    | A component of a System          |

Table 40. IBMTSESS\_ProtocolControllerForUnit class properties

| Property                                  | Type                            | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                       |
|-------------------------------------------|---------------------------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_Dependency</i>                     |                                 |                        |                                                                                                                                                                                                                                                                                   |
| <i>CIM_ProtocolControllerForDevice</i>    |                                 |                        |                                                                                                                                                                                                                                                                                   |
| DeviceNumber                              | String                          |                        | Describes the address of an associated Device in context of the antecedent Controller.<br><br>The value for IBMTSESS_ProtocolControllerForUnit is the LUN ID from "list volumeaccess" of the esscli command.                                                                      |
| AccessPriority                            | uint16                          |                        | Describes the priority given to accesses of the device through this controller. The highest priority path will have the lowest value for this parameter.<br><br>The value for IBMTSESS_ProtocolControllerForUnit is 0.                                                            |
| AccessState                               | uint16                          |                        | Indicates whether the Controller is actively commanding or accessing the Device (value=2) or not (value=3). Also, the value, "Unknown" (0), can be defined. ValueMap {0, 2, 3}, Values {Unknown, Active, Inactive}.<br><br>The value for IBMTSESS_ProtocolControllerForUnit is 3. |
| <i>CIM_ProtocolControllerForUnit</i>      |                                 |                        |                                                                                                                                                                                                                                                                                   |
| <b>IBMTSESS_ProtocolControllerForUnit</b> |                                 |                        |                                                                                                                                                                                                                                                                                   |
| Antecedent (override)                     | IBMTSESS_SCSIProtocolController | Key                    | The protocol Controller.                                                                                                                                                                                                                                                          |
| Dependent (override)                      | IBMTSESS_Volume                 | Key                    | It is the logical unit.                                                                                                                                                                                                                                                           |

Table 41. IBMTSESS\_ProtocolControllerForPort class properties

| Property                               | Type | Qualifier or Parameter | Description |
|----------------------------------------|------|------------------------|-------------|
| <i>CIM_Dependency</i>                  |      |                        |             |
| <i>CIM_ProtocolControllerForDevice</i> |      |                        |             |

Table 41. IBMTSESS\_ProtocolControllerForPort class properties (continued)

| Property                             | Type                            | Qualifier or Parameter | Description                                                                                                                                                                                                               |
|--------------------------------------|---------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DeviceNumber                         | String                          |                        | Describes the address of an associated Device in context of the antecedent Controller. The value for IBMTSESS_ProtocolControllerForPort is port ID.                                                                       |
| AccessPriority                       | uint16                          |                        | Describes the priority given to accesses of the device through this controller. The highest priority path will have the lowest value for this parameter.<br><br>The value for IBMTSESS_ProtocolControllerForPort is 0.    |
| AccessState                          | uint16                          |                        | Indicates whether the Controller is actively commanding or accessing the Device (value=2) or not (value=3). Also, the value, "Unknown" (0), can be defined.<br><br>The value for IBMTSESS_ProtocolControllerForPort is 3. |
| <i>CIM_ProtocolControllerForPort</i> |                                 |                        |                                                                                                                                                                                                                           |
| <i>IBMTSESS_ConcreteIdentityPort</i> |                                 |                        |                                                                                                                                                                                                                           |
| Antecedent (override)                | IBMTSESS_SCSIProtocolController | Key                    | It is the protocol controller.                                                                                                                                                                                            |
| Dependent (override)                 | IBMTSESS_FCPort                 | Key                    | It is the port.                                                                                                                                                                                                           |

Table 42. IBMTSESS\_AuthorizedTarget class properties

| Property                            | Type                            | Qualifier or Parameter | Description                                                           |
|-------------------------------------|---------------------------------|------------------------|-----------------------------------------------------------------------|
| <i>CIM_AuthorizedTarget</i>         |                                 |                        |                                                                       |
| <i>IBMTSESS_AuthorizationTarget</i> |                                 |                        |                                                                       |
| Privilege (override)                | IBMTSESS_Privilege              | Key                    | Describes the Privilege affecting the target resource.                |
| TargetElement (override)            | IBMTSESS_SCSIProtocolController | Key                    | Describes the target set of resources to which the Privilege applies. |

Table 43. IBMTSESS\_AuthorizedSubject class properties

| Property                          | Type | Qualifier or Parameter | Description |
|-----------------------------------|------|------------------------|-------------|
| <i>CIM_AuthorizedSubject</i>      |      |                        |             |
| <i>IBMTSESS_AuthorizedSubject</i> |      |                        |             |

Table 43. *IBMTSESS\_AuthorizedSubject* class properties (continued)

| Property                     | Type                       | Qualifier or Parameter | Description                                                                                                 |
|------------------------------|----------------------------|------------------------|-------------------------------------------------------------------------------------------------------------|
| Privilege (override)         | IBMTSESS_Privilege         | Key                    | Describes the Privilege either granted or denied to an Identity or group of Identities collected by a Role. |
| PrivilegedElement (override) | IBMTSESS_StorageHardwareID | Key                    | Describes the Subject for which Privileges are granted or denied.                                           |

Table 44. *IBMTSESS\_ConcreteDependencyPrivilege* class properties

| Property                                    | Type                             | Qualifier or Parameter | Description                                            |
|---------------------------------------------|----------------------------------|------------------------|--------------------------------------------------------|
| <i>CIM_Dependency</i>                       |                                  |                        |                                                        |
| <i>CIM_ConcreteDependency</i>               |                                  |                        |                                                        |
| <b>IBMTSESS_ConcreteDependencyPrivilege</b> |                                  |                        |                                                        |
| Antecedent (override)                       | IBMTSESS_LunMaskPrivilegeService | Key                    | Represents the independent object in this association. |
| Dependent (override)                        | IBMTSESS_Privilege               | Key                    | Represents the object dependent on the Antecedent.     |

Table 45. *IBMTSESS\_ConcreteDependencyStorageHardwareID* class properties

| Property                                            | Type                                        | Qualifier or Parameter | Description                                            |
|-----------------------------------------------------|---------------------------------------------|------------------------|--------------------------------------------------------|
| <i>CIM_Dependency</i>                               |                                             |                        |                                                        |
| <i>CIM_ConcreteDependency</i>                       |                                             |                        |                                                        |
| <i>IBMTSESS_ConcreteDependencyStorageHardwareID</i> |                                             |                        |                                                        |
| Antecedent (override)                               | IBMTSESS_StorageHardwareIDManagementService | Key                    | Represents the independent object in this association. |
| Dependent (override)                                | IBMTSESS_StorageHardwareID                  | Key                    | Represents the object dependent on the Antecedent.     |

Table 46. *IBMTSESS\_HostedService* class properties

| Property                      | Type                                 | Qualifier or Parameter | Description                                |
|-------------------------------|--------------------------------------|------------------------|--------------------------------------------|
| <i>CIM_Dependency</i>         |                                      |                        |                                            |
| <i>CIM_HostedService</i>      |                                      |                        |                                            |
| <b>IBMTSESS_HostedService</b> |                                      |                        |                                            |
| Antecedent (override)         | IBMTSESS_StorageSystem               | Key                    | Describes the hosting System               |
| Dependent (override)          | IBMTSESS_StorageConfigurationService | Key                    | Describes the service hosted on the System |

Table 47. IBMTSESS\_HostedService2 class properties

| Property                       | Type                                | Qualifier or Parameter | Description                                |
|--------------------------------|-------------------------------------|------------------------|--------------------------------------------|
| <i>CIM_Dependency</i>          |                                     |                        |                                            |
| <i>CIM_HostedService</i>       |                                     |                        |                                            |
| <b>IBMTSESS_HostedService2</b> |                                     |                        |                                            |
| Antecedent (override)          | IBMTSESS_StorageSystem              | Key                    | Describes the hosting System               |
| Dependent (override)           | IBMTSESS_LunMaskingPrivilegeService | Key                    | Describes the service hosted on the System |

Table 48. IBMTSESS\_HostedService3 class properties

| Property                 | Type                                         | Qualifier or Parameter | Description                                |
|--------------------------|----------------------------------------------|------------------------|--------------------------------------------|
| <i>CIM_Dependency</i>    |                                              |                        |                                            |
| <i>CIM_HostedService</i> |                                              |                        |                                            |
| IBMTSESS_HostedService3  |                                              |                        |                                            |
| Antecedent (override)    | IBMTSESS_StorageSystem                       | Key                    | Describes the hosting System               |
| Dependent (override)     | IBMTSESS_StorageHardwareID ManagementService | Key                    | Describes the service hosted on the System |

Table 49. IBMTSESS\_MediaPresentExtent class properties

| Property                           | Type                   | Qualifier or Parameter | Description                      |
|------------------------------------|------------------------|------------------------|----------------------------------|
| <i>CIM_Dependency</i>              |                        |                        |                                  |
| <i>CIM_MediaPresent</i>            |                        |                        |                                  |
| <i>IBMTSESS_MediaPresentExtent</i> |                        |                        |                                  |
| Antecedent (override)              | IBMTSESS_DiskDrive     | Key                    | Describes the MediaAccessDevice. |
| Dependent (override)               | IBMTSESS_StorageExtent | Key                    | Describes the StorageExtent.     |

Table 50. IBMTSESS\_ElementSettingData class properties

| Property                           | Type                    | Qualifier or Parameter | Description                                                   |
|------------------------------------|-------------------------|------------------------|---------------------------------------------------------------|
| <i>CIM_ElementSettingData</i>      |                         |                        |                                                               |
| <b>IBMTSESS_ElementSettingData</b> |                         |                        |                                                               |
| ManagedElement (override)          | IBMTSESS_Volume         | Key                    | Describes the managed element.                                |
| SettingData (override)             | IBMTSESS_StorageSetting | Key                    | Describes the SettingData object associated with the element. |



Table 51. IBMTSESS\_ElementCapabilities class properties

| Property                            | Type                         | Qualifier or Parameter | Description                                                    |
|-------------------------------------|------------------------------|------------------------|----------------------------------------------------------------|
| <i>CIM_ElementCapabilities</i>      |                              |                        |                                                                |
| <b>IBMTSESS_ElementCapabilities</b> |                              |                        |                                                                |
| ManagedElement (override)           | IBMTSESS_VolumeSpace         | Key                    | Describes the ManagedElement.                                  |
| Capabilities (override)             | IBMTSESS_StorageCapabilities | Key                    | Describes the capabilities object associated with the element. |

Table 52. IBMTSESS\_HostedStoragePool class properties

| Property                          | Type                   | Qualifier or Parameter | Description                                     |
|-----------------------------------|------------------------|------------------------|-------------------------------------------------|
| <i>CIM_Component</i>              |                        |                        |                                                 |
| <i>CIM_SystemComponent</i>        |                        |                        |                                                 |
| <i>CIM_HostedStoragePool</i>      |                        |                        |                                                 |
| <b>IBMTSESS_HostedStoragePool</b> |                        |                        |                                                 |
| GroupComponent (override)         | IBMTSESS_StorageSystem | Key                    | Represents the parent system in the Association |
| PartComponent (override)          | IBMTSESS_VolumeSpace   | Key                    | Represents the component of a System            |

Table 53. IBMTSESS\_StorageCapabilities class properties

| Property                            | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                   |
|-------------------------------------|--------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>           |        |                        |                                                                                                                                                                                                                                                                               |
| ElementName                         | String |                        | Enables each instance to define a user-friendly name in addition to its key properties or identity data, and description information.<br><br>The value for IBMTSESS_StorageCapabilities is Storage Capabilities for VolumeSpace.                                              |
| <i>CIM_Capabilities</i>             |        |                        |                                                                                                                                                                                                                                                                               |
| InstanceID                          | String | Key                    | Identifies a unique instance of Capabilities.<br><br>The value for IBMTSESS_StorageCapabilities is IBMTSESS.                                                                                                                                                                  |
| <i>CIM_StorageCapabilities</i>      |        |                        |                                                                                                                                                                                                                                                                               |
| <b>IBMTSESS_StorageCapabilities</b> |        |                        |                                                                                                                                                                                                                                                                               |
| ElementType                         | uint16 |                        | Indicates the type of element to which this StorageCapabilities applies. ValueMap{0, 1, 2, 3, 4, 5, 6}, Values {Unknown, Reserved, Any Type, StorageVolume, StorageExtent, StoragePool, StorageConfigurationService}.<br><br>The value for IBMTSESS_StorageCapabilities is 5. |

Table 53. IBMTSESS\_StorageCapabilities class properties (continued)

| Property                      | Type    | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                 |
|-------------------------------|---------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NoSinglePointOfFailure        | Boolean |                        | <p>Indicates whether or not the associated element supports no single point of failure. Values are:</p> <p><b>FALSE</b> Does not support no single point of failure.</p> <p><b>TRUE</b> Supports no single point of failure.</p> <p>The value for IBMTSESS_StorageCapabilities is TRUE.</p> |
| NoSinglePointOfFailureDefault | Boolean |                        | <p>Indicates the default value for the NoSinglePointOfFailure property.</p> <p>The value for IBMTSESS_StorageCapabilities is TRUE.</p>                                                                                                                                                      |
| DataRedundancyMax             | uint16  |                        | <p>Describes the maximum number of complete copies of data that can be maintained.</p> <p>The value for IBMTSESS_StorageCapabilities is 1.</p>                                                                                                                                              |
| DataRedundancyMin             | uint16  |                        | <p>Describes the minimum number of complete copies of data that can be maintained.</p> <p>The value for IBMTSESS_StorageCapabilities is 1.</p>                                                                                                                                              |
| DataRedundancyDefault         | uint16  |                        | <p>Describes the default number of complete copies of data that can be maintained.</p> <p>The value for IBMTSESS_StorageCapabilities is 1.</p>                                                                                                                                              |
| PackageRedundancyMax          | uint16  |                        | <p>Describes the maximum number of redundant packages that can be used.</p> <p>The value for IBMTSESS_StorageCapabilities is 1.</p>                                                                                                                                                         |
| PackageRedundancyMin          | uint16  |                        | <p>Describes the minimum number of redundant packages that can be used.</p> <p>The value for IBMTSESS_StorageCapabilities is 1.</p>                                                                                                                                                         |
| PackageRedundancyDefault      | uint16  |                        | <p>Describes the default number of redundant packages that is used.</p> <p>The value for IBMTSESS_StorageCapabilities is 1.</p>                                                                                                                                                             |
| DeltaReservationMax           | uint16  |                        | <p>DeltaReservationMin is a number between 1 (1%) and a 100 (100%) that specifies the minimum amount of space that should be reserved in a replica for caching changes.</p> <p>The value for IBMTSESS_StorageCapabilities is 100.</p>                                                       |

Table 53. IBMTSESS\_StorageCapabilities class properties (continued)

| Property                            | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                                    |
|-------------------------------------|--------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DeltaReservationMin                 | uint16 |                        | DeltaReservationMin is a number between 1 (1%) and a 100 (100%) that specifies the minimum amount of space that should be reserved in a replica for caching changes.<br><br>The value for IBMTSESS_StorageCapabilities is 100. |
| DeltaReservationDefault             | uint16 |                        | Delta reservation is a number between 1 (1%) and a 100 (100%) that specifies how much space should be reserved by default in a replica for caching changes.<br><br>The value for IBMTSESS_StorageCapabilities is 100.          |
| <b>IBMTSESS_StorageCapabilities</b> |        |                        |                                                                                                                                                                                                                                |

Table 54. IBMTSESS\_StorageSetting class properties

| Property                  | Type    | Qualifier or Parameter | Description                                                                                                                                                                                                                                    |
|---------------------------|---------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i> |         |                        |                                                                                                                                                                                                                                                |
| ElementName               | String  |                        | Enables each instance to define a user-friendly name in addition to its key properties or identity data, and description information.<br><br>The value for IBMTSESS_StorageSetting is Storage Setting for RAID5 or Storage Setting for RAID10. |
| <i>CIM_SettingData</i>    |         |                        |                                                                                                                                                                                                                                                |
| InstanceID                | String  | Key                    | Identifies an unique instance of Capabilities.<br><br>The value for IBMTSESS_StorageSetting is raid5 or raid10.                                                                                                                                |
| <i>CIM_StorageSetting</i> |         |                        |                                                                                                                                                                                                                                                |
| NoSinglePointOfFailure    | Boolean |                        | Indicates the desired value for No Single Point of Failure. Values are:<br><br><b>TRUE</b> There is no single point of failure.<br><b>FALSE</b> There is a single point of failure.<br><br>The value for IBMTSESS_StorageSetting is TRUE.      |
| DataRedundancyMax         | uint16  |                        | Describes the maximum number of complete copies of data to be maintained.<br><br>The value for raid5 is 1.<br><br>The value for raid10 is 2.                                                                                                   |
| DataRedundancyMin         | uint16  |                        | Describes the minimum number of complete copies of data to be maintained.<br><br>The value for raid5 is 1.<br><br>The value for raid10 is 2.                                                                                                   |

Table 54. IBMTSESS\_StorageSetting class properties (continued)

| Property                       | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                                  |
|--------------------------------|--------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DataRedundancyGoal             | uint16 |                        | Describes the desired number of complete copies of data to be maintained.<br><br>The value for raid5 is 1.<br><br>The value for raid10 is 2.                                                                                 |
| PackageRedundancyMax           | uint16 |                        | Describes the maximum number of redundant packages to be used.<br><br>The value for IBMTSESS_StorageSettings is 1.                                                                                                           |
| PackageRedundancyMin           | uint16 |                        | Describes the minimum number of redundant packages to be used.<br><br>The value for IBMTSESS_StorageSettings is 1.                                                                                                           |
| PackageRedundancyGoal          | uint16 |                        | Describes the desired number of redundant packages to be used.<br><br>The value for IBMTSESS_StorageSettings is 1.                                                                                                           |
| DeltaReservationMax            | uint8  |                        | DeltaReservationMax is a number between 1 (1%) and a 100 (100%) which specifies the maximum amount of space that should be reserved in a replica for caching changes.<br><br>The value for IBMTSESS_StorageSettings is 100.  |
| DeltaReservationMin            | uint8  |                        | DeltaReservationMin is a number between 1 (1%) and a 100 (100%) which specifies the minimum amount of space that should be reserved in a replica for caching changes.<br><br>The value for IBMTSESS_StorageSettings is 100.  |
| DeltaReservationGoal           | uint8  |                        | DeltaReservationGoal is a number between 1 (1%) and a 100 (100%) which specifies the desired amount of space that should be reserved in a replica for caching changes.<br><br>The value for IBMTSESS_StorageSettings is 100. |
| <b>IBMTSESS_StorageSetting</b> |        |                        |                                                                                                                                                                                                                              |

Table 55. IBMTSESS\_Chassis class properties

| Property                        | Type   | Qualifier or Parameter | Description                                                                                                                                                                             |
|---------------------------------|--------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>       |        |                        |                                                                                                                                                                                         |
| ElementName                     | String |                        | Enables each instance to define a user-friendly name in addition to its key properties or identity data, and description information.<br><br>The value for IBMTSESS_Chassis is Chassis. |
| <i>CIM_ManagedSystemElement</i> |        |                        |                                                                                                                                                                                         |
| <i>CIM_PhysicalElement</i>      |        |                        |                                                                                                                                                                                         |

Table 55. IBMTSESS\_Chassis class properties (continued)

| Property                   | Type     | Qualifier or Parameter | Description                                                                                                                                               |
|----------------------------|----------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tag                        | String   | Key                    | Uniquely identifies the Physical Element.<br><br>The value for IBMTSESS_Chassis is the ESS serial number.                                                 |
| CreationClassName          | String   | Key                    | Indicates the name of the class of the subclass used in the creation of an instance.<br><br>The value IBMTSESS_Chassis is IBMTSESS_Chassis.               |
| <i>CIM_PhysicalPackage</i> |          |                        |                                                                                                                                                           |
| <i>CIM_PhysicalFrame</i>   |          |                        |                                                                                                                                                           |
| <i>CIM_Chassis</i>         |          |                        |                                                                                                                                                           |
| NumberOfPowerCords         | uint16   |                        | Indicates the number of power cords which must be connected to the Chassis for all the components to operate.<br><br>The value for IBMTSESS_Chassis is 2. |
| CurrentRequiredOrProduced  | uint16   |                        | The value for IBMTSESS_Chassis is -1.                                                                                                                     |
| HeatGeneration             | uint16   |                        | Describes the amount of heat generated by the Chassis in BTU/hour.<br><br>The value for IBMTSESS_Chassis is 0.                                            |
| ChassisType                | uint16[] |                        | Indicates the type of Chassis.<br><br>The value for IBMTSESS_Chassis is 22, which means Storage Chassis.                                                  |
| TypeDescriptions           | String[] |                        | Provides more information on the ChassisTypes array entries.<br><br>The value for IBMTSESS_Chassis is IBM Enterprise System Server.                       |
| <b>IBMTSESS_Chassis</b>    |          |                        |                                                                                                                                                           |

Table 56. IBMTSESS\_ComputerSystemPackage class properties

| Property                              | Type                   | Qualifier or Parameter | Description                                                           |
|---------------------------------------|------------------------|------------------------|-----------------------------------------------------------------------|
| <i>CIM_Dependency</i>                 |                        |                        |                                                                       |
| <i>CIM_SystemPackaging</i>            |                        |                        |                                                                       |
| <i>CIM_ComputerSystemPackage</i>      |                        |                        |                                                                       |
| <b>IBMTSESS_ComputerSystemPackage</b> |                        |                        |                                                                       |
| Antecedent (override)                 | IBMTSESS_Chassis       | Key                    | Describes the PhysicalPackage that realizes a Unitary ComputerSystem. |
| Dependent (override)                  | IBMTSESS_StorageSystem | Key                    | Describes the UnitaryComputerSystem.                                  |

Table 57. IBMTSESS\_ExtraCapacitySet class properties

| Property                  | Type | Qualifier or Parameter | Description |
|---------------------------|------|------------------------|-------------|
| <i>CIM_ManagedElement</i> |      |                        |             |

Table 57. IBMTSESS\_ExtraCapacitySet class properties (continued)

| Property                            | Type    | Qualifier or Parameter | Description                                                                                                                                                                                                            |
|-------------------------------------|---------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ElementName                         | String  |                        | Enables each instance to define a user-friendly name in addition to its key properties or identity data, and description information.<br><br>The value for IBMTSESS_ExtraCapacitySet is Extra Capacity Set.            |
| <i>CIM_Collection</i>               |         |                        |                                                                                                                                                                                                                        |
| <i>CIM_SystemSpecificCollection</i> |         |                        |                                                                                                                                                                                                                        |
| InstanceID                          | String  | Key                    | Identifies a unique instance of collection that is scoped (contained) by a System.<br><br>The value for IBMTSESS_ExtraCapacitySet is ESS ids.                                                                          |
| <i>CIM_RedundancySet</i>            |         |                        |                                                                                                                                                                                                                        |
| RedundancyStatus                    | uint16  |                        | Provides information on the state of the RedundancySet. ValueMap {0, 1, 2, 3, 4}, Values {Unknown, Other, Fully Redundant, Degraded Redundancy, Redundancy Lost}.<br><br>The value for IBMTSESS_ExtraCapacitySet is 0. |
| <i>CIM_ExtraCapacitySet</i>         |         |                        |                                                                                                                                                                                                                        |
| MinNumberNeeded                     | uint32  |                        | Indicates the smallest number of elements that must be operational in order to function.<br><br>The value for IBMTSESS_ExtraCapacitySet is 1.                                                                          |
| MaxNumberSupported                  | uint32  |                        | Indicates the largest number of elements that can participate in the ExtraCapacitySet. A value of 0 indicates that there is not limit on the number of elements.<br><br>The value for IBMTSESS_ExtraCapacitySet is 2.  |
| LoadBalancedSet                     | Boolean |                        | Indicates whether load balancing is supported by the ExtraCapacitySet.<br><br>The value for IBMTSESS_ExtraCapacitySet is TRUE.                                                                                         |
| <b>IBMTSESS_ExtraCapacitySet</b>    |         |                        |                                                                                                                                                                                                                        |

Table 58. IBMTSESS\_ConcretelIdentityCapSet class properties

| Property                                | Type                      | Qualifier or Parameter | Description                                    |
|-----------------------------------------|---------------------------|------------------------|------------------------------------------------|
| <i>CIM_LogicalIdentity</i>              |                           |                        |                                                |
| <i>CIM_ConcretelIdentity</i>            |                           |                        |                                                |
| <b>IBMTSESS_ConcretelIdentityCapSet</b> |                           |                        |                                                |
| SystemElement (override)                | IBMTSESS_StorageSystem    | Key                    | Describes one aspect of the ManagedElement     |
| SameElement (override)                  | IBMTSESS_ExtraCapacitySet | Key                    | Describes another aspect of the ManagedElement |

Table 59. IBMTSESS\_ProductPhysicalComponent class properties

| Property                                 | Type             | Qualifier or Parameter | Description                                                |
|------------------------------------------|------------------|------------------------|------------------------------------------------------------|
| <i>CIM_Component</i>                     |                  |                        |                                                            |
| <i>CIM_ProductPhysicalComponent</i>      |                  |                        |                                                            |
| <b>IBMTSESS_ProductPhysicalComponent</b> |                  |                        |                                                            |
| GroupComponent (override)                | IBMTSESS_Product | Key                    | Describes the Product.                                     |
| PartComponent (override)                 | IBMTSESS_Chassis | Key                    | Describes the PhysicalElement that is part of the Product. |

Table 60. IBMTSESS\_RemoteServiceAccessPoint class properties

| Property                            | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                            |
|-------------------------------------|--------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>           |        |                        |                                                                                                                                                                                                                        |
| ElementName                         | String |                        | Enables each instance to define a user-friendly name in addition to its key properties or identity data, and description information.<br><br>The value for IBMTSESS_RemoteServiceAccessPoint is System Management URL. |
| <i>CIM_ManagedSystemElement</i>     |        |                        |                                                                                                                                                                                                                        |
| <i>CIM_LogicalElement</i>           |        |                        |                                                                                                                                                                                                                        |
| <i>CIM_EnabledLogicalElement</i>    |        |                        |                                                                                                                                                                                                                        |
| <i>CIM_ServiceAccessPoint</i>       |        |                        |                                                                                                                                                                                                                        |
| SystemCreationClassName             | String | Key                    | Identifies the CreationClassName for the scoping System.<br><br>The value for IBMTSESS_RemoteServiceAccessPoint is IBMTSESS_StorageSystem.                                                                             |
| SystemName                          | String | Key                    | Describes the name of the scoping System.<br><br>The value for IBMTSESS_RemoteServiceAccessPoint is the ESS ID.                                                                                                        |
| CreationClassName                   | String | Key                    | Indicates the name of the class or the subclass used in the creation of an instance.<br><br>The value for IBMTSESS_RemoteServiceAccessPoint is IBMTSESS_RemoteServiceAccessPoint.                                      |
| Name                                | String | Key                    | Uniquely identifies the ServiceAccessPoint and provides an indication of the functionality that is managed.<br><br>The value for IBMTSESS_RemoteServiceAccessPoint is RemoteServiceAccessPoint.                        |
| <i>CIM_RemoteServiceAccessPoint</i> |        |                        |                                                                                                                                                                                                                        |
| AccessInfo                          | String |                        | Access, addressing information, or both for a remote connection.<br><br>The value for IBMTSESS_RemoteServiceAccessPoint is http://" + ip address of SHARK.                                                             |

Table 60. IBMTSESS\_RemoteServiceAccessPoint class properties (continued)

| Property                                 | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------------|--------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| InfoFormat                               | uint16 |                        | Describes the format and interpretation of the AccessInfo property. ValueMap {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 100, 101, 102, 103, 104, 200, 201, 202, 203, 204, 205, .., 32768..65535}. Values {Other, Host Name, IPv4 Address, IPv6 Address, IPX Address, DECnet Address, SNA Address, Autonomous System Number, MPLS Label, IPv4 Subnet Address, IPv6 Subnet Address, IPv4 Address Range, IPv6 Address Range, Dial String, Ethernet Address, Token Ring Address, ATM Address, Frame Relay Address, URL, FQDN, User FQDN, DER ASN1 DN, DER ASN1 GN, Key ID, DMTF Reserved, Vendor Reserved}<br><br>The value for IBMTSESS_RemoteServiceAccessPoint is 200. |
| <b>IBMTSESS_RemoteServiceAccessPoint</b> |        |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

Table 61. IBMTSESS\_HostedAccessPoint class properties

| Property                          | Type                              | Qualifier or Parameter | Description                                        |
|-----------------------------------|-----------------------------------|------------------------|----------------------------------------------------|
| <i>CIM_Dependency</i>             |                                   |                        |                                                    |
| <i>CIM_HostedAccessPoint</i>      |                                   |                        |                                                    |
| <b>IBMTSESS_HostedAccessPoint</b> |                                   |                        |                                                    |
| Antecedent (override)             | IBMTSESS_StorageSystem            | Key                    | Describes the hosting System.                      |
| Dependent (override)              | IBMTSESS_RemoteServiceAccessPoint | Key                    | Describes the SAPs that are hosted on this System. |

Table 62. IBMTSESS\_StorageProcessorCard class properties

| Property                        | Type     | Qualifier or Parameter | Description                                                                                                                                                                                                                                            |
|---------------------------------|----------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>       |          |                        |                                                                                                                                                                                                                                                        |
| ElementName                     | String   |                        | Enables each instance to define a user-friendly name in addition to its key properties or identity data, and description information.<br><br>The value for IBMTSESS_StorageProcessorCard is Cluster One Processor Card and Cluster Two Processor Card. |
| <i>CIM_ManagedSystemElement</i> |          |                        |                                                                                                                                                                                                                                                        |
| OperationalStatus               | uint16[] |                        | Indicates the current statuses of the element.<br><br>The value for IBMTSESS_StorageProcessorCard is 2, which means OK.                                                                                                                                |
| <i>CIM_PhysicalElement</i>      |          |                        |                                                                                                                                                                                                                                                        |
| Tag                             | String   | Key                    | Uniquely identifies the Physical Element and serves as the key for the Element.<br><br>The value for IBMTSESS_StorageProcessorCard is the ESS ID + "Cluster One" or "Cluster Two".                                                                     |



Table 62. IBMTSESS\_StorageProcessorCard class properties (continued)

| Property                             | Type   | Qualifier or Parameter | Description                                                                                                                                                               |
|--------------------------------------|--------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CreationClassName                    | String | Key                    | Indicates the name of the class or the subclass used in the creation of an instance.<br><br>The value for IBMTSESS_StorageProcessorCard is IBMTSESS_StorageProcessorCard. |
| <i>CIM_PhysicalPackage</i>           |        |                        |                                                                                                                                                                           |
| <i>CIM_Card</i>                      |        |                        |                                                                                                                                                                           |
| <b>IBMTSESS_StorageProcessorCard</b> |        |                        |                                                                                                                                                                           |

Table 63. IBMTSESS\_ComputerSystemPackageCard class properties

| Property                                  | Type                          | Qualifier or Parameter | Description                                                          |
|-------------------------------------------|-------------------------------|------------------------|----------------------------------------------------------------------|
| <i>CIM_Dependency</i>                     |                               |                        |                                                                      |
| <i>CIM_SystemPackaging</i>                |                               |                        |                                                                      |
| <i>CIM_ComputerSystemPackaging</i>        |                               |                        |                                                                      |
| <b>IBMTSESS_ComputerSystemPackageCard</b> |                               |                        |                                                                      |
| Antecedent (override)                     | IBMTSESS_StorageProcessorCard | Key                    | Describes the PhysicalPackage that realizes a Unitary ComputerSystem |
| Dependent (override)                      | IBMTSESS_StorageSystem        | Key                    | Describe a ComputerSystem.                                           |

Table 64. IBMTSESS\_MemberOfCollection class properties

| Property                           | Type                      | Qualifier or Parameter | Description                                        |
|------------------------------------|---------------------------|------------------------|----------------------------------------------------|
| <i>CIM_MemberOfCollection</i>      |                           |                        |                                                    |
| <b>IBMTSESS_MemberOfCollection</b> |                           |                        |                                                    |
| Collection (override)              | IBMTSESS_ExtraCapacitySet | Key                    | Describes the collection that aggregates members.  |
| Member (override)                  | IBMTSESS_StorageSystem    | Key                    | Describes the aggregated member of the Collection. |

Table 65. IBMTSESS\_DiskDrive properties

| Property                         | Type   | Qualifier or Parameter | Description                                                                                                                                                                                           |
|----------------------------------|--------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>        |        |                        |                                                                                                                                                                                                       |
| ElementName                      | String |                        | Enables each instance to define a user-friendly name in addition to its key properties or identity data, and description information. The value for IBMTSESS_DiskDrive is Disk Drive on +diskgroupId. |
| <i>CIM_ManagedSystemElement</i>  |        |                        |                                                                                                                                                                                                       |
| <i>CIM_LogicalElement</i>        |        |                        |                                                                                                                                                                                                       |
| <i>CIM_EnabledLogicalElement</i> |        |                        |                                                                                                                                                                                                       |
| <i>CIM_LogicalDevice</i>         |        |                        |                                                                                                                                                                                                       |

Table 65. IBMTSESS\_DiskDrive properties (continued)

| Property                     | Type     | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------|----------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SystemCreationClassName      | String   | Key, MaxLen(256)       | Describes the CreationClassName for the scoping System. The value for IBMTSESS_DiskDrive is IBMTSESS_StorageSystem.                                                                                                                                                                                                                                                                 |
| SystemName                   | String   | Key, MaxLen(256)       | Describes the name of the scoping System. The value for IBMTSESS_DiskDrive is the serial number of the ESS.                                                                                                                                                                                                                                                                         |
| CreationClassName            | String   | Key, MaxLen(256)       | Indicates the name of the class or the subclass used in the creation of an instance. When used with the other key properties of this class, this property enables all instances of this class and its subclasses to be uniquely identified. The value for IBMTSESS_DiskDrive is IBMTSESS_DiskDrive.                                                                                 |
| DeviceID                     | String   | Key, MaxLen(64)        | Describes an address or other identifying information to uniquely name the LogicalDevice. The value for IBMTSESS_DiskDrive is the disk number, such as dd0105.                                                                                                                                                                                                                      |
| <i>CIM_MediaAccessDevice</i> |          |                        |                                                                                                                                                                                                                                                                                                                                                                                     |
| Capabilities                 | uint16[] |                        | Capabilities of the MediaAccessDevice. ValueMap {0, 1, 2, 3, 4, 5, 6, 7, 8, 9,10, 11, 12} Values{Unknown, Other, Sequential Access, Random Access, Supports Writing , Encryption, Compression, Supports Removeable Media, Manual Cleaning, Automatic Cleaning, SMART Notification, Supports Dual Sided Media ,Predismount Eject Not Required The value for IBMTSESS_DiskDrive is 3. |
| CapabilityDescriptions       | String[] |                        | Provides more detailed explanation for any of the AccessDevice features indicated in the Capabilities array. The value for IBMTSESS_DiskDrive is disk capacity + GB Disk Drive.                                                                                                                                                                                                     |
| NumberOfMediaSupported       | uint32   |                        | The value for IBMTSESS_DiskDrive is 1.                                                                                                                                                                                                                                                                                                                                              |
| MaxMediaSize                 | uint64   |                        | Describes the maximum size, in KBytes, of media supported by this device                                                                                                                                                                                                                                                                                                            |
| DefaultBlockSize             | uint64   |                        | Describes the default block size, in bytes, for this device. The value for IBMTSESS_DiskDrive is 512.                                                                                                                                                                                                                                                                               |
| MaxBlockSize                 | uint64   |                        | Describes the maximum block size, in bytes, for media accessed by this device. The value for IBMTSESS_DiskDrive is 512.                                                                                                                                                                                                                                                             |
| MinBlockSize                 | uint64   |                        | Describes the minimum block size, in bytes, for media accessed by this device. The value for IBMTSESS_DiskDrive is 512.                                                                                                                                                                                                                                                             |
| NeedsCleaning                | Boolean  |                        | Indicates that the MediaAccessDevice needs cleaning. The value for IBMTSESS_DiskDrive is FALSE.                                                                                                                                                                                                                                                                                     |

Table 65. IBMTSESS\_DiskDrive properties (continued)

| Property                  | Type    | Qualifier or Parameter | Description                                                                                                                                                                                                                              |
|---------------------------|---------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MedialsLocked             | Boolean |                        | Indicates that the media is locked in the device and cannot be ejected. The value for IBMTSESS_DiskDrive is FALSE.                                                                                                                       |
| Security                  | uint16  |                        | Indicates the operational security defined for the MediaAccessDevice. ValueMap {1, 2, 3, 4, 5, 6, 7} Values {Other, Unknown, None, Read Only, Locked Out, Boot Bypass, Boot Bypass and Read Only} The value for IBMTSESS_DiskDrive is 1. |
| <i>DiskDrive</i>          |         |                        |                                                                                                                                                                                                                                          |
| <b>IBMTSESS_DiskDrive</b> |         |                        |                                                                                                                                                                                                                                          |

Table 66. IBMTSESS\_PhysicalPackage class properties

| Property                        | Type    | Qualifier or Parameter | Description                                                                                                                                                                                                           |
|---------------------------------|---------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>       |         |                        |                                                                                                                                                                                                                       |
| ElementName                     | String  |                        | Enables each instance to define a user-friendly name in addition to its key properties or identity data and description information. The value for IBMTSESS_PhysicalPackage is Disk Group on ESS + ESS serial number. |
| <i>CIM_ManagedSystemElement</i> |         |                        |                                                                                                                                                                                                                       |
| Name                            | String  |                        | Defines the label by which the object is known. When subclassed, the Name property can be overridden to be a Key property. The value for IBMTSESS_PhysicalPackage will be ESS serial number.                          |
| <i>CIM_PhysicalElement</i>      |         |                        |                                                                                                                                                                                                                       |
| Tag                             | String  | Key                    | Uniquely identifies the Physical Element and serves as the key for the Element. The value for IBMTSESS_PhysicalPackage is diskGroupId-ESS serial number.                                                              |
| CreationClassName               | String  | Key                    | Indicates the name of the class or the subclass used in the creation of an instance. The value for IBMTSESS_PhysicalPackage is IBMTSESS_PhysicalPackage.                                                              |
| Manufacturer                    | String  |                        | Describes the name of the organization responsible for producing the PhysicalElement. The value for IBMTSESS_PhysicalPackage is IBM.                                                                                  |
| Model                           | String  |                        | Describes the name by which the PhysicalElement is generally known. The value for IBMTSESS_PhysicalPackage is 2105.                                                                                                   |
| PoweredOn                       | Boolean |                        | Indicates that the PhysicalElement is powered on. The value for IBMTSESS_PhysicalPackage is TRUE.                                                                                                                     |
| CanBeFRUed                      | Boolean |                        | Indicates whether this PhysicalElement uses field replaceable units (FRUs). The value for IBMTSESS_PhysicalPackage is TRUE.                                                                                           |

Table 66. IBMTSESS\_PhysicalPackage class properties (continued)

| Property                        | Type    | Qualifier or Parameter | Description                                                                                                                                                                                                                                       |
|---------------------------------|---------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OtherIdentifyingInfo            | String  |                        | Captures additional data, beyond that of the Tag information, that is used to identify a PhysicalElement.<br><br>The value for IBMTSESS_PhysicalPackage is the redundancy type for the disk group.                                                |
| <i>CIM_PhysicalPackage</i>      |         |                        |                                                                                                                                                                                                                                                   |
| Removable                       | Boolean |                        | A PhysicalPackage is Removable if it is designed to be taken in and out of the physical container in which it is normally found, without impairing the function of the overall packaging.<br><br>The value for IBMTSESS_PhysicalPackage is FALSE. |
| Replaceable                     | Boolean |                        | A PhysicalPackage is Replaceable if it is possible to replace the Element with a physically different one.<br><br>The value for IBMTSESS_PhysicalPackage is TRUE.                                                                                 |
| HotSwappable                    | Boolean |                        | A PhysicalPackage is HotSwappable if it is possible to replace the Element with a physically different but equivalent one while the containing Package has power applied to it.<br><br>The value for IBMTSESS_PhysicalPackage is FALSE.           |
| Width                           | real32  |                        | The width of the PhysicalPackage.                                                                                                                                                                                                                 |
| <b>IBMTSESS_PhysicalPackage</b> |         |                        |                                                                                                                                                                                                                                                   |
| location                        | string  |                        | Describes the location of the diskgroup.                                                                                                                                                                                                          |

Table 67. IBMTSESS\_MediaPresent class properties

| Property                     | Type               | Qualifier or Parameter | Description                      |
|------------------------------|--------------------|------------------------|----------------------------------|
| <i>CIM_Dependency</i>        |                    |                        |                                  |
| <i>CIM_MediaPresent</i>      |                    |                        |                                  |
| <b>IBMTSESS_MediaPresent</b> |                    |                        |                                  |
| Antecedent (override)        | IBMTSESS_DiskDrive | Key                    | Describes the MediaAccessDevice. |
| Dependent (override)         | IBMTSESS_Volume    | Key                    | Describes the StorageExtent.     |

Table 68. IBMTSESS\_Realizes class properties

| Property                 | Type | Qualifier or Parameter | Description |
|--------------------------|------|------------------------|-------------|
| <i>CIM_Dependency</i>    |      |                        |             |
| <i>CIM_Realizes</i>      |      |                        |             |
| <b>IBMTSESS_Realizes</b> |      |                        |             |

Table 68. IBMTSESS\_Realizes class properties (continued)

| Property              | Type                     | Qualifier or Parameter | Description                                                  |
|-----------------------|--------------------------|------------------------|--------------------------------------------------------------|
| Antecedent (override) | IBMTSESS_PhysicalPackage | Key                    | Describes the physical component that implements the Device. |
| Dependent (override)  | IBMTSESS_DiskDrive       | Key                    | Describes the LogicalDevice.                                 |

Table 69. IBMTSESS\_SystemDevice class properties

| Property                     | Type                   | Qualifier or Parameter | Description                                     |
|------------------------------|------------------------|------------------------|-------------------------------------------------|
| <i>CIM_Component</i>         |                        |                        |                                                 |
| <i>CIM_SystemComponent</i>   |                        |                        |                                                 |
| <i>SystemDevice</i>          |                        |                        |                                                 |
| <b>IBMTSESS_SystemDevice</b> |                        |                        |                                                 |
| GroupComponent (override)    | IBMTSESS_StorageSystem | Key                    | Describes the parent system in the Association. |
| PartComponent (override)     | IBMTSESS_DiskDrive     | Key                    | Describes the component of a System.            |

Table 70. IBMTSESS\_ControllerConfigurationService class properties

| Property                         | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                                      |
|----------------------------------|--------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>        |        |                        |                                                                                                                                                                                                                                  |
| ElementName                      | String |                        | Allows each instance to define a user-friendly name in addition to its key properties/identity data and description information.<br><br>The value for IBMTSESS_ControllerConfigurationService is ControllerConfigurationService. |
| <i>CIM_ManagedSystemElement</i>  |        |                        |                                                                                                                                                                                                                                  |
| <i>CIM_LogicalElement</i>        |        |                        |                                                                                                                                                                                                                                  |
| <i>CIM_EnabledLogicalElement</i> |        |                        |                                                                                                                                                                                                                                  |
| <i>CIM_Service</i>               |        |                        |                                                                                                                                                                                                                                  |
| SystemCreationClassName          | String | Key, MaxLen(256)       | Describes the scoping System's CreationClassName.<br><br>The value for IBMTSESS_ControllerConfigurationService is IBMTSESS_StorageSystem.                                                                                        |
| SystemName                       | String | Key, MaxLen(256)       | Describes the scoping System's Name.<br><br>The value for IBMTSESS_ControllerConfigurationService is ESS serial number.                                                                                                          |

Table 70. IBMTSESS\_ControllerConfigurationService class properties (continued)

| Property                                       | Type   | Qualifier or Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Description                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CreationClassName                              | String | Key, MaxLen(256)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Indicates the name of the class or the subclass used in the creation of an instance. When used with the other key properties of this class, this property allows all instances of this class and its subclasses to be uniquely identified.<br><br>The value for IBMTSESS_ControllerConfigurationService is IBMTSESS_ControllerConfigurationService.             |
| Name                                           | String | Key, MaxLen(64)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Describes an address or other identifying information to uniquely name the LogicalElement.<br><br>The value for IBMTSESS_ControllerConfigurationService is Controller Configuration Service.                                                                                                                                                                    |
| <i>CIM_ControllerConfigurationService</i>      |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                 |
| <i>IBMTSESS_ControllerConfigurationService</i> |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                 |
| CreateProtocolController                       | uint32 | [IN, Description (The string to be used in the ElementName of the new ProtocolController.) ] string ElementName, [IN, Description (Array of strings containing representations of references to IBMTSESS_FCPort (or subclass) instances.) ] string Ports[], [IN, OUT (false), Description (The protocol type for the new ProtocolController.)] uint16 Protocol, [IN, Description( NOT supported.)] String Privileges[], [IN, Description(NOT supported.)] string Identities[], [OUT, Description (The new ProtocolController.) ] IBMTSESS_SCSIProtocolController REF ProtocolController. | Creates an appropriate subclass of ProtocolController.<br>Description of return values:<br><br><b>0</b> Success<br><br><b>4</b> Failed (Result might be intermittent, You may need to look into it.)<br><br><b>5</b> Invalid Parameter Ports<br><br><b>0x8000</b> Invalid Protocol<br><br><b>0x8011</b> Cannot create temporary controller in CIMOM repository. |

Table 70. IBMTSESS\_ControllerConfigurationService class properties (continued)

| Property                 | Type   | Qualifier or Parameter                                                                                                                                                                                                                                                               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DeleteProtocolController | uint32 | [IN, OUT (false), Description (The ProtocolController to be deleted.) ]<br>IBMTSESS_<br>SCSIProtocolController REF<br>ProtocolController, [IN, Description(Not Supported.)) boolean<br>DeleteChildrenProtocol<br>Controllers, [IN, Description(Not Supported.)) boolean DeleteUnits. | Deletes the ProtocolController and all associations connected directly to this ProtocolController. Description of return values:<br><br><b>0</b> Success<br><br><b>1</b> Not Supported<br><br><b>4</b> Failed (Result might be intermittent. You may need to look into it.)<br><br><b>5</b> Invalid ProtocolController<br><br><b>0x8010</b> You should remove access first.<br><br><b>0x8020</b> Controller processing fails (Fail to delete controller.) |

Table 70. IBMTSESS\_ControllerConfigurationService class properties (continued)

| Property     | Type   | Qualifier or Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AttachDevice | uint32 | [IN, OUT (false), Description (The ProtocolController instance.) ]<br>IBMTSESS_SCSIProtocolController REF<br>ProtocolController, [IN, OUT (false), Description (The LogicalDevice instance to attach.) ]<br>IBMTSESS_Volume REF Device, [IN, OUT, Description (The number assigned to ProtocolControllerForUnit .DeviceNumber if supported by the hardware (indicated by Masking Capabilities.MapUnits set to true) or if MapUnits is false, but the DeviceNumber has not been established in an existing ProtocolController ForDevice subclass.) ] string<br>DeviceNumber | Associates a LogicalDevice subclass to a ProtocolController. Description of return values:<br><br><b>0</b> Success<br><b>1</b> Not Supported<br><b>4</b> Failed (Result might be intermittent. You may need to look into it.)<br><b>5</b> Invalid SCSIProtocol Controller<br><b>0x1000</b> Invalid Parameter Device<br><b>0x1001</b> Hardware implementation requires null deviceNumber.<br><b>0x8000</b> Authorization failure<br><b>0x8010</b> You should AssignAccess first.<br><b>0x8011</b> Device instance is already attached to a Host.<br><b>0x8020</b> IBMTSESS cannot attach device as specified. (ESS CLI cannot create volumeaccess" as specified.)<br><b>0x8030</b> Creating an indication failure |



Table 70. IBMTSESS\_ControllerConfigurationService class properties (continued)

| Property        | Type | Qualifier or Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AttachDeviceS() |      | <p>[Override("AttachDeviceS"), Description (This method associates a number of LogicalDevice subclass (specifically a StorageVolume or MediaAccessDevice subclass) to the referenced ProtocolController. The associations are persisted as instances of ProtocolControllerForUnit. The management instrumentation provider must verify that the logical unit numbers (defined using the DeviceNumber input parameter) are unique for the ProtocolController. When the Protocol Controller is actively masking a device (that is, is part of an AuthorizedTarget association), the provider should update the access configuration in the underlying hardware as appropriate ), ValueMap {0, 1, 2, 3, 4, 5, 6..4095, 4096, 4097, 4098, 4099, 4100, 4101..32767,32768..65535}, Values {Success, Not Supported, Unspecified Error, Timeout, Failed, Invalid Parameter, DMTF Reserved, Invalid LogicalDevice Instance, Device Number Conflict, DeviceNumber Parameter Must Be Provided, Hardware Implementation Requires Null DeviceNumber, Busy, Method Reserved, Vendor Specific} ] uint32 AttachDeviceS ( [IN, OUT (false), Description (The ProtocolController instance.) ] IBMTSESS_SCSIProtocolController REF ProtocolController, [IN, OUT (false), Description (The Devices to attach.) ] string Devices[], [IN, OUT, Description (The number assigned to ProtocolControllerForUnit.DeviceNumber if supported by the hardware (indicated by Masking Capabilitie s.MapUnits set to true) or if MapUnits is false, but the DeviceNumber has not been established in an existing ProtocolController ForDevice subclass.) ] string DeviceNumber);</p> | <p>Associates a LogicalDevice subclass to a ProtocolController. Description of return values:</p> <p><b>0</b> Success</p> <p><b>1</b> Not Supported</p> <p><b>4</b> Failed (Result might be intermittent. You might need to look into it.)</p> <p><b>5</b> Invalid SCSIProtocolController</p> <p><b>0x1000</b> Invalid Parameter Device</p> <p><b>0x1001</b> Hardware implementation requires null deviceNumber.</p> <p><b>0x8010</b> You should AssignAccess first.</p> <p><b>0x8020</b> IBMTSESS cannot attach device as specified. (ESS CLI cannot "create volumeaccess" as specified.)</p> <p><b>0x8030</b> Creating an indication failure</p> |

Table 70. IBMTSESS\_ControllerConfigurationService class properties (continued)

| Property     | Type   | Qualifier or Parameter                                                                                                                                                                                                                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DetachDevice | uint32 | [IN, OUT (false), Description (The ProtocolController instance.) ]<br>IBMTSESS_SCSIProtocolController REF<br>ProtocolController, [IN, OUT (false), Description (The LogicalDevice instance to detach.)]<br>IBMTSESS_Volume REF Device | Remove the ProtocolControllerForDevice association subclass between the ProtocolController and device. Description of return values:<br><br><b>0</b> Success<br><b>1</b> Not Supported<br><b>4</b> Failed (Result might be intermittent. You may need to look into it.)<br><b>5</b> Invalid Controller<br><b>0x1000</b> Invalid parameter Device<br><b>0x8000</b> Authorization failure<br><b>0x8001</b> Cannot remove device since it is not attached.<br><b>0x8020</b> IBMTSESS cannot remove device as specified. (ESS CLI cannot "delete volumeaccess" as specified.)<br><b>0x8030</b> Creating an indication failure |

Table 70. IBMTSESS\_ControllerConfigurationService class properties (continued)

| Property        | Type | Qualifier or Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DetachDeviceS() |      | [Description (This method removes the ProtocolControllerForDevice association subclass between the ProtocolController and a set of LogicalDevice, such as a set of StorageVolumes. When the ProtocolController is actively masking a device (for example, is part of an AuthorizedTarget association, the management instrumentation provider should update the hardware access configuration when DetachDevice is called.), ValueMap {0, 1, 2, 3, 4, 5, 6..4095, 4096, 4097, 4098..32767, 32768..65535}, Values {Success, Not Supported, The Unspecified Error, Timeout, Failed, Invalid Parameter, DMTF Reserved, LogicalDevice Instance not Associated with Controller, Busy, Method Reserved, Vendor Specific}] uint32 DetachDeviceS ([IN, OUT (false), Description (The ProtocolController instance.)] IBMTSESS_SCSIProtocolController REF ProtocolController, [IN, OUT (false), Description (The LogicalDevice instance to detach.)] string Devices[] | Removes the ProtocolControllerForDevice association subclass between the ProtocolController and device. Description of return values:<br><br><b>0</b> Success<br><b>1</b> Not Supported<br><b>4</b> Failed (Result might be intermittent. You may need to look into it.)<br><b>5</b> Invalid Controller<br><b>0x1000</b> Invalid parameter Device<br><b>0x8000</b> Authorization failure<br><b>0x8001</b> Cannot remove device since it is not attached.<br><b>0x8020</b> IBMTSESS cannot remove device as specified. (ESS CLI cannot "delete volumeaccess" as specified.)<br><b>0x8030</b> Creating an indication failure |

Table 71. IBMTSESS\_HostedService4 class properties

| Property                | Type                                    | Qualifier or Parameter | Description                                 |
|-------------------------|-----------------------------------------|------------------------|---------------------------------------------|
| CIM_Dependency          |                                         |                        |                                             |
| CIM_HostedService       |                                         |                        |                                             |
| IBMTSESS_HostedService2 |                                         |                        |                                             |
| Antecedent (override)   | IBMTSESS_StorageSystem                  | Key                    | Describes the hosting System.               |
| Dependent (override)    | IBMTSESS_ControllerConfigurationservice | Key                    | Describes the Service hosted on the System. |

Table 72. IBMTSESS\_DeviceMaskingCapabilities class properties

| Property           | Type | Qualifier or Parameter | Description |
|--------------------|------|------------------------|-------------|
| CIM_ManagedElement |      |                        |             |

Table 72. IBMTSESS\_DeviceMaskingCapabilities class properties (continued)

| Property                                         | Type     | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------|----------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ElementName                                      | String   |                        | Allows each instance to define a user-friendly name in addition to its key properties/identity data and description information.<br><br>The value for IBMTSESS_DeviceMaskingCapabilities is IBMTS.                                                                                                                                                                                                                                                                                                                                                                                               |
| Caption                                          | String   |                        | The value for IBMTSESS_DeviceMaskingCapabilities is IBM ESS Masking Capabilities.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Description                                      | String   |                        | The value for IBMTSESS_DeviceMaskingCapabilities is IBM ESS Masking Capabilities.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <i>CIM_Capabilities</i>                          |          |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| InstanceID                                       | String   | Key                    | Identifies a unique instance of Capabilities.<br><br>The value for IBMTSESS_DeviceMaskingCapabilities is IBM DeviceMaskingCapabilities.                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <i>CIM_ProtocolControllerMaskingCapabilities</i> |          |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| ValidHardwareIdTypes                             | uint16[] |                        | A list of the valid values for StorageHardwareID. IDType ValueMap {1, 2, 3, 4}, Values {Other, PortWWN, NodeWWN, Hostname}.<br><br>The value for IBMTSESS_DeviceMaskingCapabilities is 2.                                                                                                                                                                                                                                                                                                                                                                                                        |
| AccessControlByPorts                             | Boolean  |                        | Indicates whether the associated storage system allows ProtocolControllers with different authorization permissions or subjects associated with a subset of the storage system's ports. Values are:<br><br><b>TRUE</b> The associated storage system allows ProtocolControllers with different authorization permissions or subjects associated with a subset of the storage system's ports.<br><br><b>FALSE</b> The associated storage system always grants access to initiators identically through all storage system ports.<br><br>The value for IBMTSESS_DeviceMaskingCapabilities is TRUE. |

Table 72. IBMTSESS\_DeviceMaskingCapabilities class properties (continued)

| Property                      | Type    | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------|---------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ClientSelectableDeviceNumbers | Boolean |                        | <p>Indicates whether this storage system allows the client to specify the DeviceNumber parameter when calling ControllerConfigurationService.AttachDevice(). Values are:</p> <p><b>TRUE</b> This storage system allows the client to specify the DeviceNumber parameter when calling ControllerConfigurationService.AttachDevice().</p> <p><b>FALSE</b> The implementation does not allow unit numbers to vary across ProtocolController. If set to false and the Device is already the Dependent of a ProtocolControllerForUnit association, then the client can omit the DeviceNumber parameter (or supply the same value) in subsequent ControllerConfigurationService.AttachDevice calls.</p> <p>The value for IBMTSESS_DeviceMaskingCapabilities is FALSE.</p> |
| AttachDeviceSupported         | Boolean |                        | <p>Indicates whether this storage system supports the AttachDevice method. Values are:</p> <p><b>TRUE</b> This storage system supports the AttachDevice method.</p> <p><b>FALSE</b> This storage system does not support the AttachDevice method.</p> <p>The value for IBMTSESS_DeviceMaskingCapabilities is TRUE.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| OneHardwareIDPerView          | Boolean |                        | <p>Indicates whether this storage system limits configurations to a single subject hardware ID per view. Values are:</p> <p><b>TRUE</b> This storage system limits configurations to a single subject hardware ID per view.</p> <p><b>FALSE</b> This storage system does not limit configurations to a single subject hardware ID per view.</p> <p>The value for IBMTSESS_DeviceMaskingCapabilities is TRUE.</p>                                                                                                                                                                                                                                                                                                                                                    |

Table 72. IBMTSESS\_DeviceMaskingCapabilities class properties (continued)

| Property                           | Type    | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------|---------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OnePortPerView                     | Boolean |                        | <p>Indicates whether this storage system limits configurations to a single port per view. Values are:</p> <p><b>TRUE</b> This storage system limits configurations to a single port per view.</p> <p><b>FALSE</b> This storage system does not limit configurations to a single port per view.</p> <p>The value for IBMTSESS_DeviceMaskingCapabilities is TRUE.</p>                                                                                |
| UniqueUnitNumbersPerPort           | Boolean |                        | <p>Indicates whether this storage system requires unique unit numbers across all the ProtocolControllers connected to a port. Values are:</p> <p><b>TRUE</b> This storage system requires unique unit numbers across all the ProtocolControllers connected to a port.</p> <p><b>FALSE</b> Different ProtocolControllers attached to a port can expose the same unit numbers.</p> <p>The value for IBMTSESS_DeviceMaskingCapabilities is FALSE.</p> |
| IBMTSESS_DeviceMaskingCapabilities |         |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

Table 73. IBMTSESS\_ElementCapabilitiesMasking class properties

| Property                            | Type                                    | Qualifier or Parameter | Description                                                    |
|-------------------------------------|-----------------------------------------|------------------------|----------------------------------------------------------------|
| CIM_ElementCapabilities             |                                         |                        |                                                                |
| IBMTSESS_ElementCapabilitiesMasking |                                         |                        |                                                                |
| ManagedElement (override)           | IBMTSESS_ControllerConfigurationservice | Key                    | Describes the ManagedElement.                                  |
| Capabilities (override)             | IBMTSESS_DeviceMaskingCapabilities      | Key                    | Describes the Capabilities object associated with the element. |

Table 74. IBMTSESS\_ConcreteDependencyController class properties

| Property                              | Type                                    | Qualifier or Parameter | Description                                            |
|---------------------------------------|-----------------------------------------|------------------------|--------------------------------------------------------|
| CIM_Dependency                        |                                         |                        |                                                        |
| CIM_ConcreteDependency                |                                         |                        |                                                        |
| IBMTSESS_ConcreteDependencyController |                                         |                        |                                                        |
| Antecedent (override)                 | IBMTSESS_ControllerConfigurationService | Key                    | Represents the independent object in this association. |

Table 74. *IBMTSESS\_ConcreteDependencyController* class properties (continued)

| Property             | Type                            | Qualifier or Parameter | Description                                        |
|----------------------|---------------------------------|------------------------|----------------------------------------------------|
| Dependent (override) | IBMTSESS_SCSIProtocolController | Key                    | Represents the object dependent on the Antecedent. |

Table 75. *IBMTSESS\_RegisteredProfile* class properties

| Property                     | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------|--------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>    |        |                        |                                                                                                                                                                                                                                                                                                                                                                                                             |
| <i>CIM_RegisteredProfile</i> |        |                        |                                                                                                                                                                                                                                                                                                                                                                                                             |
| InstanceID                   | String | Key                    | Uniquely identifies an instance of this class.<br><br>The value for IBMTSESS_StandardProfile is RegisteredProfile1 or RegisteredProfile2 or RegisteredProfile3 or RegisteredProfile4 or RegisteredProfile5 or RegisteredProfile6 or RegisteredProfile7 or RegisteredProfile8 or RegisteredProfile9 or RegisteredProfile10.                                                                                  |
| RegisteredOrganization       | uint16 |                        | The organization that defines the definition for this standard. ValueMap {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, Values {Other, DMTF, CompTIA, Consortium for Service Innovation, FAST, GGF, INTAP, itSMF, NAC, Northwest Energy Efficiency Alliance, SNIA, TM Forum, The Open Group, ANSI, IEEE, IETF, INCITS, ISO, W3C}.<br><br>The value for IBMTSESS_StandardProfile is 11. |

Table 75. IBMTSESS\_RegisteredProfile class properties (continued)

| Property                   | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------|--------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RegisteredName             | String |                        | <p>Identifies this standard (profile or subprofile). It is the responsibility of the organization to ensure that the standard's name is unique within the scope of the organization .</p> <p>The value for "RegisteredProfile1" is Array.</p> <p>The value for "RegisteredProfile2" is Cluster.</p> <p>The value for "RegisteredProfile3" is Extra Capacity Sets.</p> <p>The value for "RegisteredProfile4" is Software.</p> <p>The value for "RegisteredProfile5" is Location.</p> <p>The value for "RegisteredProfile6" is Access Points.</p> <p>The value for "RegisteredProfile7" is Pool Manipulation, Capabilities &amp; Settings.</p> <p>The value for "RegisteredProfile8" is Configuration - LUN creation.</p> <p>The value for "RegisteredProfile9" is LUN Mapping &amp; MaskingThe value for "RegisteredProfile10" is Copy Services.</p> |
| RegisteredVersion          | String |                        | <p>The version of this standard (profile or subprofile).</p> <p>The value for IBMTSESS_StandardProfile is 0.1.0.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| IBMTSESS_RegisteredProfile |        |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

Table 76. IBMTSESS\_SubProfileExtendsProfile class properties

| Property                          | Type                       | Qualifier or Parameter | Description                                                        |
|-----------------------------------|----------------------------|------------------------|--------------------------------------------------------------------|
| CIM_Dependency                    |                            |                        |                                                                    |
| CIM_ReferencedProfile             |                            |                        |                                                                    |
| IBMTSESS_SubProfileExtendsProfile |                            |                        |                                                                    |
| Antecedent (override)             | IBMTSESS_RegisteredProfile | Key                    | The RegisteredProfile that is referenced by the Dependent Profile. |
| Dependent (override)              | IBMTSESS_RegisteredProfile | Key                    | A RegisteredProfile that references other profiles.                |



Table 77. IBMTSESS\_ElementConformsToProfile class properties

| Property                                 | Type                       | Qualifier or Parameter | Description                                                 |
|------------------------------------------|----------------------------|------------------------|-------------------------------------------------------------|
| <i>CIM_ElementConformsToProfile</i>      |                            |                        |                                                             |
| <i>IBMTSESS_ElementConformsToProfile</i> |                            |                        |                                                             |
| ConformantStandard (override)            | IBMTSESS_RegisteredProfile | Key                    | The RegisteredProfile to which the ManagedElement conforms. |
| ManagedElement (override)                | IBMTSESS_StorageSystem     | Key                    | The ManagedElement that conforms to the RegisteredProfile.  |

Table 78. IBMTSESS\_Location class properties

| Property                  | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                   |
|---------------------------|--------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i> |        |                        |                                                                                                                                                                                                                                                                                                                               |
| ElementName               | String |                        | Allows each instance to define a user-friendly name in addition to its key properties/identity data and description information.<br><br>The value for IBMTSESS_Location is DataCenter1.                                                                                                                                       |
| <i>CIM_Location</i>       |        |                        |                                                                                                                                                                                                                                                                                                                               |
| Name                      | String | Key                    | Describes a free-form string defining a label for the Location. It is a part of the key for the object.<br><br>The value for IBMTSESS_Location is DataCenter1.                                                                                                                                                                |
| PhysicalPosition          | String | Key                    | Describes a free-form string indicating the placement of a PhysicalElement. It can specify slot information on a HostingBoard, mounting site in a Cabinet, or latitude and longitude information, for example, from a GPS. It is part of the key of the Location object.<br><br>The value for IBMTSESS_Location is Some Rack. |
| <b>IBMTSESS_Location</b>  |        |                        |                                                                                                                                                                                                                                                                                                                               |

Table 79. IBMTSESS\_PhysicalElementLocation class properties

| Property                                | Type             | Qualifier or Parameter | Description                                                 |
|-----------------------------------------|------------------|------------------------|-------------------------------------------------------------|
| <i>CIM_ElementLocation</i>              |                  |                        |                                                             |
| <i>CIM_PhysicalElementLocation</i>      |                  |                        |                                                             |
| <i>IBMTSESS_PhysicalElementLocation</i> |                  |                        |                                                             |
| Element (override)                      | IBMTSESS_Chassis | Key                    | Represents the PhysicalElement whose Location is specified. |

Table 79. IBMTSESS\_PhysicalElementLocation class properties (continued)

| Property                    | Type              | Qualifier or Parameter | Description                                |
|-----------------------------|-------------------|------------------------|--------------------------------------------|
| PhysicalLocation (override) | IBMTSESS_Location | Key                    | Represents the PhysicalElement's Location. |

Table 80. IBMTSESS\_StorageClientSettingData class properties

| Property                                 | Type     | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------|----------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>                |          |                        |                                                                                                                                                                                                                                                                                                                                                               |
| ElementName                              | String   |                        | Allows each instance to define a user-friendly name in addition to its key properties/identity data, and description information.<br><br>The value for IBMTSESS_InitiatorSettingData is "StorageClientSetting for "+operation system.                                                                                                                         |
| <i>CIM_SettingData</i>                   |          |                        |                                                                                                                                                                                                                                                                                                                                                               |
| InstanceID                               | String   | Key                    | Identifies an unique instance of Capabilities.<br><br>The value for IBMTSESS_InitiatorSettingData is operating system.                                                                                                                                                                                                                                        |
| <i>CIM_StorageClientSettingData</i>      |          |                        |                                                                                                                                                                                                                                                                                                                                                               |
| ClientTypes                              | uint16[] |                        | These names map to combinations of OperatingSystem, Version, Driver, and other host environment factors that influence the behavior exposed by storage systems. ValueMap {3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16} Values {Solaris, HP-UX, OpenVMS, Tru64, Netware, AIX, DGUX, Dynix, Irix, Cisco iSCSI Storage Router, Linux, Microsoft Windows, OS400} |
| OtherClientTypeDescriptions              | String   |                        | Array entries correspond to entries in InitiatorTypes to allow variations or qualifications of InitiatorTypes. If InitiatorTypes is 3, then it is {SOLARIS251,SOLARIS26}. If InitiatorTypes is 14, then it is {LINUX,LINUXPPC,LINUX390}.                                                                                                                      |
| <i>IBMTSESS_StorageClientSettingData</i> |          |                        |                                                                                                                                                                                                                                                                                                                                                               |

Table 81. IBMTSESS\_InitiatorElementSettingData class properties

| Property                                    | Type                       | Qualifier or Parameter | Description                    |
|---------------------------------------------|----------------------------|------------------------|--------------------------------|
| <i>CIM_ElementSettingData</i>               |                            |                        |                                |
| <i>IBMTSESS_InitiatorElementSettingData</i> |                            |                        |                                |
| ManagedElement (override)                   | IBMTSESS_StorageHardwareID | Key                    | Describes the managed element. |

Table 81. IBMTSESS\_InitiatorElementSettingData class properties (continued)

| Property               | Type                              | Qualifier or Parameter | Description                                                   |
|------------------------|-----------------------------------|------------------------|---------------------------------------------------------------|
| SettingData (override) | IBMTSESS_StorageClientSettingData | Key                    | Describes the SettingData object associated with the element. |

Table 82. IBMTSESS\_StorageExtent class properties

| Property                         | Type     | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------|----------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>        |          |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <i>CIM_ManagedSystemElement</i>  |          |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| OperationalStatus                | uint16[] |                        | Indicates the current status of the element. Various functional and non-functional statuses are defined. ValueMap {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18}, Values {Unknown, Other, OK, Degraded, Stressed, Predictive Failure, Error, Non-Recoverable Error, Starting, Stopping, Stopped, In Service, No Contact, Lost Communication, Aborted, Dormant, Supporting Entity in Error, Completed, Power Mode}.<br><br>The value for IBMTSESS_StorageExtent is {2}. |
| <i>CIM_LogicalElement</i>        |          |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <i>CIM_EnabledLogicalElement</i> |          |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <i>CIM_LogicalDevice</i>         |          |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| SystemCreationClassName          | String   | Key, MaxLen(256)       | Describes the scoping System's CreationClassName.<br><br>The value for IBMTSESS_StorageExtent is IBMTSESS_StorageSystem.                                                                                                                                                                                                                                                                                                                                                                   |
| SystemName                       | String   | Key, MaxLen(256)       | Describes the scoping System's Name.<br><br>The value for IBMTSESS_StorageExtent is the ESS serial number to which this diskgroup belongs.                                                                                                                                                                                                                                                                                                                                                 |

Table 82. IBMTSESS\_StorageExtent class properties (continued)

| Property                 | Type    | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------|---------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CreationClassName        | String  | Key, MaxLen(256)       | <p>Indicates the name of the class or the subclass used in the creation of an instance. When used with the other key properties of this class, this property allows all instances of this class and its subclasses to be uniquely identified.</p> <p>The value for IBMTSESS_StorageExtent is IBMTSESS_StorageExtent.</p>                                                                                                                                                    |
| DeviceID                 | String  | Key, MaxLen(64)        | <p>Describes an address or other identifying information to uniquely name the LogicalDevice.</p> <p>The value for IBMTSESS_StorageExtent is the diskgroup id obtained from the esscli, such as dg2.</p>                                                                                                                                                                                                                                                                     |
| <i>CIM_StorageExtent</i> |         |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Primordial               | Boolean |                        | <p>Indicates whether the containing System does not have the ability to create or delete this operational element. Values are:</p> <p><b>TRUE</b> \“Primordial\”indicates that the containing System does not have the ability to create or delete this operational element.</p> <p><b>FALSE</b> \“Primordial\”indicates that the containing System has the ability to create or delete this operational element.</p> <p>The value for IBMTSESS_StorageExtent is FALSE.</p> |
| BlockSize                | uint64  |                        | <p>Describes the size in bytes of the blocks which form this StorageExtent. If variable block size, then the maximum block size in bytes should be specified. If the block size is unknown or if a block concept is not valid (for example, for AggregateExtents, Memory or LogicalDisks), enter a 1. Units (“Bytes”).</p> <p>The value for IBMTSESS_StorageExtent is 1.</p>                                                                                                |

Table 82. IBMTSESS\_StorageExtent class properties (continued)

| Property                      | Type     | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------|----------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NumberOfBlocks                | uint64   |                        | Describes the total number of logically contiguous blocks, of size Block Size, which form this Extent. The total size of the Extent is calculated by multiplying BlockSize by NumberOfBlocks. If the BlockSize is 1, this property is the total size of the Extent.                                                                                                                                                                                                                                                                                            |
| ExtentStatus                  | uint16[] |                        | StorageExtents have additional status information beyond that captured in the OperationalStatus and other properties, inherited from ManagedSystemElement. ValueMap {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15..32767, 32768..65535}, Values {Other, Unknown, None/Not Applicable, Broken, Data Lost, Dynamic Reconfig, Exposed, Fractionally Exposed, Partially Exposed, Protection Disabled, Readyng,Rebuild, Recalculate, Spare in Use, Verify In Progress, DMTF Reserved, Vendor Reserved}.<br><br>The value for IBMTSESS_StorageExtent is {2}. |
| <b>IBMTSESS_StorageExtent</b> |          |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| diskGrpStatus                 | String   |                        | Describes the status of the diskgroup from ESS CLI.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

Table 83. IBMTSESS\_Component class properties

| Property                  | Type                   | Qualifier or Parameter | Description                   |
|---------------------------|------------------------|------------------------|-------------------------------|
| <i>CIM_Component</i>      |                        |                        |                               |
| <i>IBMTSESS_Component</i> |                        |                        |                               |
| GroupComponent (override) | IBMTSESS_StorageExtent | Key                    | Describes the GroupComponent. |
| PartComponent (override)  | IBMTSESS_VolumeSpace   | Key                    | Describes the PartComponent.  |

Table 84. IBMTSESS\_PrimordialStoragePool class properties

| Property                  | Type | Qualifier or Parameter | Description |
|---------------------------|------|------------------------|-------------|
| <i>CIM_ManagedElement</i> |      |                        |             |

Table 84. IBMTSESS\_PrimordialStoragePool class properties (continued)

| Property                              | Type    | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------|---------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ElementName                           | String  |                        | Allows each instances to define a user-friendly name in addition to its key properties/identity data and description information.<br><br>The value for IBMTSESS_PrimordialStoragePool is PrimordialStoragePool.                                                                                                                                                                                                                                                  |
| <i>CIM_ManagedSystemElement</i>       |         |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <i>CIM_LogicalElement</i>             |         |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <i>CIM_StoragePool</i>                |         |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| InstanceID                            | String  | Key                    | Identifies a unique instance of StoragePool.<br><br>The value for IBMTSESS_PrimordialStoragePool is the ESS serial number.                                                                                                                                                                                                                                                                                                                                       |
| PoolID                                | String  |                        | A unique name in the context of the System that identifies this pool.<br><br>The value for IBMTSESS_PrimordialStoragePool is PrimordialStoragePool.                                                                                                                                                                                                                                                                                                              |
| Primordial                            | Boolean |                        | Indicates that the containing System does not have the ability to create or delete this operational element.<br><br><b>TRUE</b> \\'Primordial\' indicates that the containing System does not have the ability to create or delete this operational element.<br><br><b>FALSE</b> \\'Primordial\' indicates that the containing System has the ability to create or delete this operational element.<br><br>The value for IBMTSESS_PrimordialStoragePool is TRUE. |
| TotalManagedSpace                     | uint64  |                        | The total amount of raw storage (in bytes) managed by this StoragePool.<br><br>The value for IBMTSESS_PrimordialStoragePool is the total size of the diskgroups.                                                                                                                                                                                                                                                                                                 |
| RemainingManagedSpace                 | uint64  |                        | Describes the remaining capacity available in bytes.                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>IBMTSESS_PrimordialStoragePool</b> |         |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

Table 84. IBMTSESS\_PrimordialStoragePool class properties (continued)

| Property          | Type   | Qualifier or Parameter                                                                                                                                                                                                                                                                                                                                             | Description                                                                                                                                                                                                                                              |
|-------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GetSupportedSizes | String | [IN, Description(The type of element for which supported sizes are reported for.), ValueMap{2, 3}, Values {Storage Pool, Storage Volume}] uint16 ElementType, [IN, Description (Not Supported.)) CIM_StorageSetting REF Goal, [OUT, IN(false), Description (List of support sizes for a Volume/Pool creation or "modification."), Units ("Bytes") ] uint64 Sizes[] | Used to retrieve a list of supported sizes for pool creation. Descriptions of return values:<br><br><b>0</b> Success<br><br><b>4</b> Failed (Result might be intermittent. You may need to investigate it.)<br><br><b>0x8000</b> ElementType is invalid. |

Table 85. IBMTSESS\_HostedPrimordialStoragePool class properties

| Property                                    | Type                           | Qualifier or Parameter | Description                   |
|---------------------------------------------|--------------------------------|------------------------|-------------------------------|
| <i>CIM_Component</i>                        |                                |                        |                               |
| <i>CIM_SystemComponent</i>                  |                                |                        |                               |
| <i>CIM_HostedStoragePool</i>                |                                |                        |                               |
| <i>IBMTSESS_HostedPrimordialStoragePool</i> |                                |                        |                               |
| GroupComponent (override)                   | IBMTSESS_StorageSystem         | Key                    | Describes the GroupComponent. |
| PartComponent (override)                    | IBMTSESS_PrimordialStoragePool | Key                    | Describes the PartComponent.  |

Table 86. IBMTSESS\_StorageSynchronized class properties

| Property                            | Type            | Qualifier or Parameter | Description                                                   |
|-------------------------------------|-----------------|------------------------|---------------------------------------------------------------|
| <i>CIM_Synchronized</i>             |                 |                        |                                                               |
| <i>CIM_StorageSynchronized</i>      |                 |                        |                                                               |
| <i>IBMTSESS_StorageSynchronized</i> |                 |                        |                                                               |
| SystemElement (override)            | IBMTSESS_Volume | Key                    | Represents the Storage that is the source of the replication. |
| SyncedElement (override)            | IBMTSESS_Volume | Key                    | Represents the Storage that is the target of the replication. |

Table 87. IBMTSESS\_EltCapabilitiesStgPool class properties

| Property                       | Type | Qualifier or Parameter | Description |
|--------------------------------|------|------------------------|-------------|
| <i>CIM_ElementCapabilities</i> |      |                        |             |

Table 87. IBMTSESS\_EltCapabilitiesStgPool class properties (continued)

| Property                               | Type                           | Qualifier or Parameter | Description                                                    |
|----------------------------------------|--------------------------------|------------------------|----------------------------------------------------------------|
| <b>IBMTSESS_EltCapabilitiesStgPool</b> |                                |                        |                                                                |
| ManagedElement (override)              | IBMTSESS_PrimordialStoragePool | Key                    | Describes the ManagedElement.                                  |
| Capabilities (override)                | IBMTSESS_StorageCapabilities   | Key                    | Describes the Capabilities object associated with the element. |

Table 88. IBMTSESS\_Provider class properties

| Property                 | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                             |
|--------------------------|--------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SystemName               | String | Key, MaxLen(256)       | Describes the scoping System's Name.<br><br>The value for IBMTSESS_Provider is IBM Provider.                                                                                                                                                                                                            |
| CreationClassName        | String | Key, MaxLen(256)       | Indicates the name of the class or the subclass used in the creation of an instance. When used with the other key properties of this class, this property allows all instances of this class and its subclasses to be uniquely identified.<br><br>The value for IBMTSESS_Provider is IBMTSESS_Provider. |
| Name                     | String | Key, MaxLen(64)        | Describes an address or other identifying information to uniquely name the LogicalElement.<br><br>The value for IBMTSESS_Provider is IBM ESS Provider.                                                                                                                                                  |
| <i>CIM_WBEMService</i>   |        |                        |                                                                                                                                                                                                                                                                                                         |
| <i>CIM_Provider</i>      |        |                        |                                                                                                                                                                                                                                                                                                         |
| <b>IBMTSESS_Provider</b> |        |                        |                                                                                                                                                                                                                                                                                                         |
| Version                  | String |                        | Describes the version of the ESS Provider code.                                                                                                                                                                                                                                                         |

Table 89. IBMTSESS\_VolumeStatistics class properties

| Property                   | Type | Qualifier or Parameter | Description |
|----------------------------|------|------------------------|-------------|
| <i>CIM_ManagedElement</i>  |      |                        |             |
| <i>CIM_StatisticalData</i> |      |                        |             |



Table 89. IBMTSESS\_VolumeStatistics class properties (continued)

| Property                         | Type     | Qualifier or Parameter | Description                                                                                                                                                                    |
|----------------------------------|----------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| InstanceID                       | String   | Key                    | InstanceID opaquely identifies a unique instance of StatisticalData. The key contains [ESSID]+ "-" + [VolID] where VolID is the DeviceID of the corresponding IBMTSESS_Volume. |
| ElementName                      | String   |                        | The user-friendly name for this instance of StatisticalData.                                                                                                                   |
| StartStatisticTime               | Datetime |                        | Retrieves the time when the statistics collection started.                                                                                                                     |
| StatisticTime                    | Datetime |                        | Provides the timestamp for this statistics instance.                                                                                                                           |
| SampleInterval                   | Datetime |                        | Describes the frequency of the statistics collection.                                                                                                                          |
| <i>IBMTSESS_VolumeStatistics</i> |          |                        |                                                                                                                                                                                |
| ReadIOOperations                 | uint64   |                        | SeqReadIOOperations + DirectReadIOOperations                                                                                                                                   |
| WriteIOOperations                | uint64   |                        | SeqWriteIOOperations + DirectWriteIOOperations                                                                                                                                 |
| SeqReadIOOperations              | uint64   |                        | Taken from the ESS statistics file (Volume Statistics): Sequential I/O - I/O requests - Read Count.                                                                            |
| DirectReadIOOperations           | uint64   |                        | Taken from the ESS statistics file (Volume Statistics): Normal I/O - I/O requests - Read Count.                                                                                |
| SeqWriteIOOperations             | uint64   |                        | Taken from the ESS statistics file (Volume Statistics): Sequential I/O - I/O requests - Write Count.                                                                           |
| DirectWriteIOOperations          | uint64   |                        | Taken from the ESS statistics file (Volume Statistics): Normal I/O - I/O requests - Write Count.                                                                               |
| BytesRead                        | uint64   |                        | Not supported.                                                                                                                                                                 |
| BytesWritten                     | uint64   |                        | Taken from the ESS statistics file (Volume Statistics): Cache -> Disk ops.                                                                                                     |
| SeqBytesRead                     | uint64   |                        | Taken from the ESS statistics file (Volume Statistics): Disk -> Cache seq.                                                                                                     |
| DirectBytesRead                  | uint64   |                        | Taken from the ESS statistics file (Volume Statistics): Disk -> Cache ops.                                                                                                     |
| NumberOfCacheHitsforReads        | uint64   |                        | NumberOfCacheOsforReadSeq + NumberOfCacheOsforReadDirect                                                                                                                       |
| NumberOfCacheHitsforWrites       | uint64   |                        | NumberOfCacheOsforWriteSeq + NumberOfCacheOsforWriteDirect                                                                                                                     |

Table 89. IBMTSESS\_VolumeStatistics class properties (continued)

| Property                      | Type    | Qualifier or Parameter | Description                                                                                        |
|-------------------------------|---------|------------------------|----------------------------------------------------------------------------------------------------|
| NumberOfCacheOsforReadSeq     | uint64  |                        | Taken from the ESS statistics file (Volume Statistics): Sequential I/O - Cache hits - Read Count.  |
| NumberOfCacheOsforWriteSeq    | uint64  |                        | Taken from the ESS statistics file (Volume Statistics): Sequential I/O - Cache hits - Write Count. |
| NumberOfCacheOsforReadDirect  | uint64  |                        | Taken from the ESS statistics file (Volume Statistics): Normal I/O - Cache hits - Read Count.      |
| NumberOfCacheOsforWriteDirect | uint64  |                        | Taken from the ESS statistics file (Volume Statistics): Normal I/O - Cache hits - Write Count.     |
| IOOperations                  | uint64  |                        | ReadIOOperations + WriteIOOperations                                                               |
| NumberOfIOsServicedFromCache  | uint64  |                        | NumberOfCacheHitsforReads + NumberOfCacheHitsforWrites.                                            |
| DasdFastWriteIOs              | uint64  |                        | Taken from the ESS statistics file (Volume Statistics): DasdFastWrite ops.                         |
| DasdFastWriteSeq              | uint64  |                        | Taken from the ESS statistics file (Volume Statistics): DasdFastWrite seq.                         |
| VolumeNumber                  | uint64  |                        | Taken from the ESS statistics file (Volume Statistics): Volume number.                             |
| RankName                      | String  |                        | Taken from the ESS statistics file (Volume Statistics): Rank name.                                 |
| RankID                        | uint64  |                        | Taken from the ESS statistics file (Volume Statistics): Rank ID.                                   |
| CacheAvailable                | Boolean |                        | Taken from the ESS statistics file (Volume Statistics): Cache Available.                           |
| DasdFastWriteDel              | uint64  |                        | Taken from the ESS statistics file (Volume Statistics): DasdFastWrite del.                         |
| RecCacheReadMisses            | uint64  |                        | Taken from the ESS statistics file (Volume Statistics): RecCacheRead Misses.                       |
| TrackPromFailures             | uint64  |                        | Taken from the ESS statistics file (Volume Statistics): TrackProm. Failures.                       |
| RecModeReads                  | uint64  |                        | Taken from the ESS statistics file (Volume Statistics): RecMode reads.                             |
| NVSAllocations                | uint64  |                        | Taken from the ESS statistics file (Volume Statistics): NVS Allocations.                           |

Table 89. IBMTSESS\_VolumeStatistics class properties (continued)

| Property                   | Type   | Qualifier or Parameter | Description                                                                                 |
|----------------------------|--------|------------------------|---------------------------------------------------------------------------------------------|
| CCXRCReadOps               | uint64 |                        | Taken from the ESS statistics file (Volume Statistics): CC/XRC ops - Read Count.            |
| CCXRCWriteOps              | uint64 |                        | Taken from the ESS statistics file (Volume Statistics): CC/XRC ops - Write Count.           |
| PPRCTransfers              | uint64 |                        | Taken from the ESS statistics file (Volume Statistics): PPRC Transfers.                     |
| CSCDelayedOps              | uint64 |                        | Taken from the ESS statistics file (Volume Statistics): CSC Delayed ops.                    |
| CacheFastWriteIOReadCount  | uint64 |                        | Taken from the ESS statistics file (Volume Statistics): Cache Fast Write I/O - Read Count.  |
| CacheFastWriteIOWriteCount | uint64 |                        | Taken from the ESS statistics file (Volume Statistics): Cache Fast Write I/O - Write Count. |
| QuickWritePromotes         | uint64 |                        | Taken from the ESS statistics file (Volume Statistics): Quick write promotes.               |
| IrregularTrackAccess       | uint64 |                        | Taken from the ESS statistics file (Volume Statistics): Irregular track access.             |
| IrregularTrackAccessHits   | uint64 |                        | Taken from the ESS statistics file (Volume Statistics): Irregular track access hits.        |

Table 90. IBMTSESS\_VolumeSpaceStatistics class properties

| Property                              | Type     | Qualifier or Parameter | Description                                                                                                                                                              |
|---------------------------------------|----------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>             |          |                        |                                                                                                                                                                          |
| <i>CIM_StatisticalData</i>            |          |                        |                                                                                                                                                                          |
| InstanceID                            | String   | Key                    | Identifies a unique instance of StatisticalData. The key contains [VolSpaceID]+ "-" +[ESSID] where VolSpaceID is the DeviceID of the corresponding IBMTSESS_VolumeSpace. |
| ElementName                           | String   |                        | The user-friendly name for this instance of StatisticalData.                                                                                                             |
| StartStatisticTime                    | Datetime |                        | Retrieves the time when the statistics collection started.                                                                                                               |
| StatisticTime                         | Datetime |                        | Retrieves the timestamp for this statistics instance.                                                                                                                    |
| SampleInterval                        | Datetime |                        | Describes the frequency of the statistics collection.                                                                                                                    |
| <b>IBMTSESS_VolumeSpaceStatistics</b> |          |                        |                                                                                                                                                                          |

Table 90. IBMTSESS\_VolumeSpaceStatistics class properties (continued)

| Property          | Type   | Qualifier or Parameter | Description                                                                                  |
|-------------------|--------|------------------------|----------------------------------------------------------------------------------------------|
| ReadIOOperations  | uint64 |                        | Taken from the ESS statistics file (Disk Group Statistics): I/O requests - Read Count.       |
| WriteIOOperations | uint64 |                        | Taken from the ESS statistics file (Disk Group Statistics): I/O requests - Write Count.      |
| BytesRead         | uint64 |                        | Taken from the ESS statistics file (Disk Group Statistics): FixedBlockSec ops - Read Count.  |
| BytesWritten      | uint64 |                        | Taken from the ESS statistics file (Disk Group Statistics): FixedBlockSec ops - Write Count. |
| ReadTime          | uint64 |                        | Taken from the ESS statistics file (Disk Group Statistics): Response Time - Read Count.      |
| WriteTime         | uint64 |                        | Taken from the ESS statistics file (Disk Group Statistics): Response Time - Write Count.     |
| IOOperations      | uint64 |                        | ReadIOOperations + WriteIOOperations                                                         |
| BytesTransferred  | uint64 |                        | BytesRead + BytesWritten                                                                     |
| RankName          | String |                        | Taken from the ESS statistics file (Disk Group Statistics): Rank.                            |
| RankID            | String |                        | Taken from the ESS statistics file (Disk Group Statistics): Rank ID.                         |
| NumberOfDDMs      | uint64 |                        | Taken from the ESS statistics file (Disk Group Statistics): Number of DDMs.                  |
| SectorSize        | uint64 |                        | Taken from the ESS statistics file (Disk Group Statistics): Sector Size.                     |
| RankType          | uint64 |                        | Taken from the ESS statistics file (Disk Group Statistics): Rank Type.                       |
| VS                | String |                        | The DeviceID of the corresponding IBMTSESS_VolumeSpace.                                      |

Table 91. IBMTSESS\_VolumeStatisticalData class properties

| Property                       | Type                      | Qualifier or Parameter | Description                     |
|--------------------------------|---------------------------|------------------------|---------------------------------|
| CIM_ElementStatisticalData     |                           |                        |                                 |
| IBMTSESS_VolumeStatisticalData |                           |                        |                                 |
| ManagedElement (override)      | IBMTSESS_Volume           | Key                    | Describes the Volume.           |
| Stats (override)               | IBMTSESS_VolumeStatistics | Key                    | Describes the VolumeStatistics. |

Table 92. IBMTSESS\_VolumeSpaceStatisticalData class properties

| Property                                   | Type                           | Qualifier or Parameter | Description                          |
|--------------------------------------------|--------------------------------|------------------------|--------------------------------------|
| <i>CIM_ElementStatisticalData</i>          |                                |                        |                                      |
| <b>IBMTSESS_VolumeSpaceStatisticalData</b> |                                |                        |                                      |
| ManagedElement (override)                  | IBMTSESS_VolumeSpace           | Key                    | Describes the VolumeSpace.           |
| Stats (override)                           | IBMTSESS_VolumeSpaceStatistics | Key                    | Describes the VolumeSpaceStatistics. |

Table 93. IBMTSESS\_PerformanceStatisticsService class properties

| Property                                     | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------------------|--------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ElementName                                  | String |                        | Allows each instance to define a user-friendly name in addition to its key properties/identity data and description information.                                                                                                                                                                                                                |
| <i>CIM_ManagedSystemElement</i>              |        |                        |                                                                                                                                                                                                                                                                                                                                                 |
| <i>CIM_LogicalElement</i>                    |        |                        |                                                                                                                                                                                                                                                                                                                                                 |
| <i>CIM_EnabledLogicalElement</i>             |        |                        |                                                                                                                                                                                                                                                                                                                                                 |
| <i>CIM_Service</i>                           |        |                        |                                                                                                                                                                                                                                                                                                                                                 |
| SystemCreationClassName                      | String | Key, MaxLen(256)       | Describes the scoping System's CreationClassName.<br><br>The value for IBMTSESS_PerformanceStatisticsService is IBMTSESS_StorageSystem.                                                                                                                                                                                                         |
| SystemName                                   | String | Key, MaxLen(256)       | Describes the scoping System's Name.<br><br>The value for IBMTSESS_PerformanceStatisticsService is the ESS serial number.                                                                                                                                                                                                                       |
| CreationClassName                            | String | Key, MaxLen(256)       | Indicates the name of the class or the subclass used in the creation of an instance. When used with the other key properties of this class, this property allows all instances of this class and its subclasses to be uniquely identified.<br><br>The value for IBMTSESS_PerformanceStatisticsService is IBMTSESS_PerformanceStatisticsService. |
| Name                                         | String | Key, MaxLen(64)        | Describes an address or other identifying information to uniquely name the LogicalElement.                                                                                                                                                                                                                                                      |
| <i>IBMTSESS_PerformanceStatisticsService</i> |        |                        |                                                                                                                                                                                                                                                                                                                                                 |
| StatisticsCollection                         | String |                        | It is 'enabled' if the performance statistics collection is turned on. It is 'disabled' if the performance statistics collection is turned off.                                                                                                                                                                                                 |
| Frequency                                    | uint64 |                        | Describes the collection frequency.                                                                                                                                                                                                                                                                                                             |

Table 93. IBMTSESS\_PerformanceStatisticsService class properties (continued)

| Property                  | Type   | Qualifier or Parameter                                                                                                                                                                                                                                                                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Port                      | uint16 |                                                                                                                                                                                                                                                                                                 | Describes the port on the host that receives the performance data.                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| GetStatisticsFiles        | uint32 | [OUT, IN(false), Description ( The statistics file for cluster one. Each line of the file is one string in the array.)) String FileClusterOne[], [OUT, IN(false), Description (The statistics file for cluster two. Each line of the file is one string in the array.)) String FileClusterTwo[] | Retrieves the performance statistics files. The statistics files can only be retrieved when the performance statistics collection is turned on.                                                                                                                                                                                                                                                                                                                                                         |
| StartStatisticsCollection | uint32 | [IN, Description ( The port on the host that receives the performance data. This parameter is optional.)) uint16 Port, [IN, Description (The collection frequency in minutes. This parameter is optional.)) uint16 Frequency                                                                    | Starts the statistics collection. The method has the following return codes:<br><br><b>0</b> Success<br>This return code indicates that the performance statistics collection has been started successfully.<br><br><b>1</b> Failed<br>This return code indicates that the performance statistics collection could not be started. A possible reason is that the ESS is not able to serve client requests at this time.<br><br><b>2</b> The performance statistics collection has already been started. |
| StopStatisticsCollection  | uint32 |                                                                                                                                                                                                                                                                                                 | Stops the statistics collection. The method has the following return codes:<br><br><b>0</b> Success<br>This return code indicates that the performance statistics collection has been stopped successfully.<br><br><b>1</b> Failed<br>This return code indicates that the performance statistics collection can not be stopped. A possible reason is that the ESS is not able to serve client requests at this time.<br><br><b>2</b> The performance statistics collection has not been started before. |

Table 94. IBMTSESS\_HostedService6 class properties

| Property                       | Type                                  | Qualifier or Parameter | Description                                 |
|--------------------------------|---------------------------------------|------------------------|---------------------------------------------|
| <i>CIM_Dependency</i>          |                                       |                        |                                             |
| <i>CIM_HostedService</i>       |                                       |                        |                                             |
| <b>IBMTSESS_HostedService6</b> |                                       |                        |                                             |
| Antecedent (override)          | IBMTSESS_StorageSystem                | Key                    | Describes the hosting System.               |
| Dependent (override)           | IBMTSESS_PerformanceStatisticsService | Key                    | Describes the Service hosted on the System. |

Table 95. IBMTSESS\_RemoteVolume

| Property                  | Type   | Qualifier or Parameter | Description                                                                       |
|---------------------------|--------|------------------------|-----------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i> |        |                        |                                                                                   |
| EssID                     | String | Key                    | Describes the ESS Serial Number, such as 2105.22232.                              |
| LssID                     | String | Key                    | Describes the Logical SubSystem Number. It is a string in two digits hexadecimal. |
| VolID                     | String | Key                    | Describes the VolumeID. It is a string in 4 digits hexadecimal.                   |

Table 96. IBMTSESS\_RemoteSourceStorageSynchronized class properties

| Property                                        | Type                  | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------|-----------------------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>                       |                       |                        |                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>IBMTSESS_RemoteSourceStorageSynchronized</b> |                       |                        |                                                                                                                                                                                                                                                                                                                                                                                                             |
| SystemElement (override)                        | IBMTSESS_RemoteVolume | Key                    | Represents the Storage that is the source of the replication.                                                                                                                                                                                                                                                                                                                                               |
| SyncedElement (override)                        | IBMTSESS_Volume       | Key                    | Represents the Storage that is the target of the replication.                                                                                                                                                                                                                                                                                                                                               |
| CopyType                                        | uint16                |                        | Describes the Replication Policy. ValueMap 2, 3, 4, 5, ..., 0x8000 ..., Values Async, Sync, UnSyncAssoc, UnSyncUnAssoc, DMTF Reserved, Vendor Specific}                                                                                                                                                                                                                                                     |
| SyncMaintained                                  | Boolean               |                        | Indicates whether the synchronization is being maintained on an ongoing basis.<br><br>This property's value maybe TRUE or FALSE. A transition from TRUE to FALSE indicates that a fracture has occurred or been requested. A transition from FALSE to TRUE indicates that a resync operation has occurred or been requested. SyncMaintained is always FALSE for point-in-time copies (that is, Flash Copy). |

Table 96. IBMTSESS\_RemoteSourceStorageSynchronized class properties (continued)

| Property  | Type    | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                                               |
|-----------|---------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SyncState | uint16  |                        | Describes the state of the association with respect to Replication activity.<br><br>The values may be Fractured, ReSync In Progress , or Idle.                                                                                                                                                                                                                            |
| Ordered   | Boolean |                        | Indicates whether writes to the replica may not be in the same sequence as writes to the source.<br><br><b>TRUE</b> Writes to the replica may be in the same sequence as writes to the source.<br><br><b>FALSE</b> Writes to the replica may not be in the same sequence as writes to the source.<br><br>The value for IBMTSESS_RemoteSourceStorageSynchronized is FALSE. |

Table 97. IBMTSESS\_RemoteTargetStorageSynchronized

| Property                                        | Type                  | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------|-----------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CIM_ManagedElement</i>                       |                       |                        |                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>IBMTSESS_RemoteTargetStorageSynchronized</b> |                       |                        |                                                                                                                                                                                                                                                                                                                                                                                                          |
| SystemElement (override)                        | IBMTSESS_Volume       | Key                    | Represents the Storage that is the source of the replication.                                                                                                                                                                                                                                                                                                                                            |
| SyncedElement (override)                        | IBMTSESS_RemoteVolume | Key                    | Represents the Storage that is the target of the replication.                                                                                                                                                                                                                                                                                                                                            |
| CopyType                                        | uint16                |                        | Describes the Replication Policy. ValueMap {2, 3, 4, 5, .., 0x8000...}, Values {Async, Sync, UnSyncAssoc, UnSyncUnAssoc, DMTF Reserved, Vendor Specific}                                                                                                                                                                                                                                                 |
| SyncMaintained                                  | Boolean               |                        | Indicates whether the synchronization is being maintained on an ongoing basis.<br><br>This property's value may be TRUE or FALSE. A transition from TRUE to FALSE indicates that a fracture has occurred or been requested. A transition from FALSE to TRUE indicates that a resync operation has occurred or been requested. SyncMaintained is always FALSE for point-in-time copies (i.e. Flash Copy). |
| SyncState                                       | uint16                |                        | Describes the state of the association with respect to Replication activity.<br><br>The values may be Fractured, ReSync In Progress, or Idle.                                                                                                                                                                                                                                                            |



Table 97. IBMTSESS\_RemoteTargetStorageSynchronized (continued)

| Property | Type    | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                                                                                           |
|----------|---------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ordered  | Boolean |                        | <p>Indicates whether writes to the replica may not be in the same sequence as writes to the source.</p> <p><b>TRUE</b> Writes to the replica may be in the same sequence as writes to the source.</p> <p><b>FALSE</b> Writes to the replica may not be in the same sequence as writes to the source.</p> <p>The value for IBMTSESS_RemoteTargetStorageSynchronized will be FALSE.</p> |

Table 98. IBMTSESS\_PPRCPath

| Property                     | Type   | Qualifier or Parameter | Description                                                                                                                                                                                                                                                                                                    |
|------------------------------|--------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>ManagedElement</i>        |        |                        |                                                                                                                                                                                                                                                                                                                |
| <i>ManagedSystemElement</i>  |        |                        |                                                                                                                                                                                                                                                                                                                |
| <i>LogicalElement</i>        |        |                        |                                                                                                                                                                                                                                                                                                                |
| <i>EnabledLogicalElement</i> |        |                        |                                                                                                                                                                                                                                                                                                                |
| <i>LogicalDevice</i>         |        |                        |                                                                                                                                                                                                                                                                                                                |
| SystemCreationClassName      | String | Key, MaxLen(256)       | <p>Describes the scoping System's CreationClassName.</p> <p>The value for IBMTSESS_PPRCPath is IBMTSESS_StorageSystem.</p>                                                                                                                                                                                     |
| SystemName                   | String | Key, MaxLen(256)       | <p>Describes the scoping System's Name.</p> <p>The value for IBMTSESS_PPRCPath is the ESS serial number.</p>                                                                                                                                                                                                   |
| CreationClassName            | String | Key, MaxLen(256)       | <p>Indicates the name of the class or the subclass used in the creation of an instance. When used with the other key properties of this class, this property allows all instances of this class and its subclasses to be uniquely identified.</p> <p>The value for IBMTSESS_PPRCPath is IBMTSESS_PPRCPath.</p> |

Table 98. IBMTSESS\_PPRCPath (continued)

| Property                 | Type   | Qualifier or Parameter | Description                                                                                                                                                                                             |
|--------------------------|--------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DeviceID                 | String | Key, MaxLen(256)       | Describes an address or other identifying information to uniquely name the LogicalDevice.<br><br>The value for IBMTSESS_PPRCPath is essid+"-"+sourceLSSNumber+"-"+targetLSSNumber+"-"+sourcePortNumber. |
| <b>IBMTSESS_PPRCPath</b> |        |                        |                                                                                                                                                                                                         |
| Type                     | uint16 |                        | Specifies that a path (IBMTSESS_PPRCPath) has a type. It can be either ESCON or FCP. ValueMap {0, 1}, Values {ESCON, FCP}                                                                               |
| State                    | uint16 |                        | Describes the state of the path.                                                                                                                                                                        |
| SourcePort               | String |                        | Describes the port number of the source lss.                                                                                                                                                            |
| SourceLSSID              | String |                        | Describes the source LSS ID.                                                                                                                                                                            |
| TargetLSSID              | String |                        | Describes the target LSS ID.                                                                                                                                                                            |
| SourceServer             | String |                        | Describes the identification of the source machine (ESS).                                                                                                                                               |
| TargetSequenceNumber     | String |                        | Describes the sequence number of the target machine (ESS)                                                                                                                                               |
| TargetSSID               | uint16 |                        | Describes the Subsystem Identifier (SSID) of the target machine (ESS)                                                                                                                                   |

#### Related topics:

- “ESS class definition schemas”
- “CIM Agent communication concepts” on page 123
- Appendix A, “ESS API component definitions,” on page 121
- “CIM Agent Communication methods” on page 124
- “Error codes returned by the CIMOM” on page 135

## ESS class definition schemas

This section illustrates the architecture for the CIM Agent. Individual functional views show the components that are used for a specific function.

#### Individual functional schemas:

The specific functionality provided by the CIMOM permits configuration, discovery of subsystems and devices (LUNs), LUN creation, LUN deletion, LUN masking and LUN unmasking. Each of the following diagrams shows the class definitions that apply to these functions. Figure 6 on page 215 shows the classes and their related associations that represent the physical package to the ESS.

## Physical Package Instance Diagram

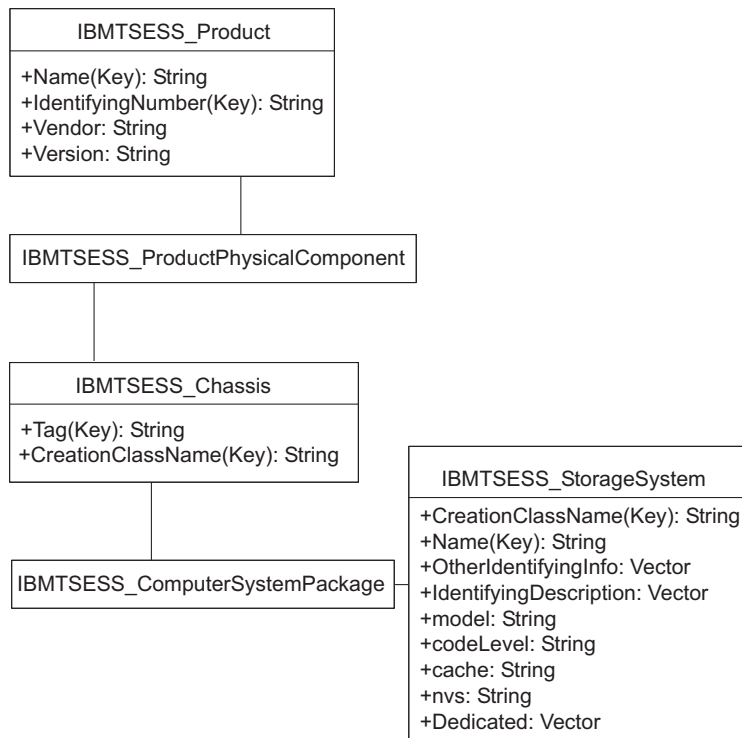


Figure 6. Physical package instance diagram

Figure 7 on page 216 shows the classes and their related associations that represent the storage classes to the ESS.

## Array Profile Instance Diagram

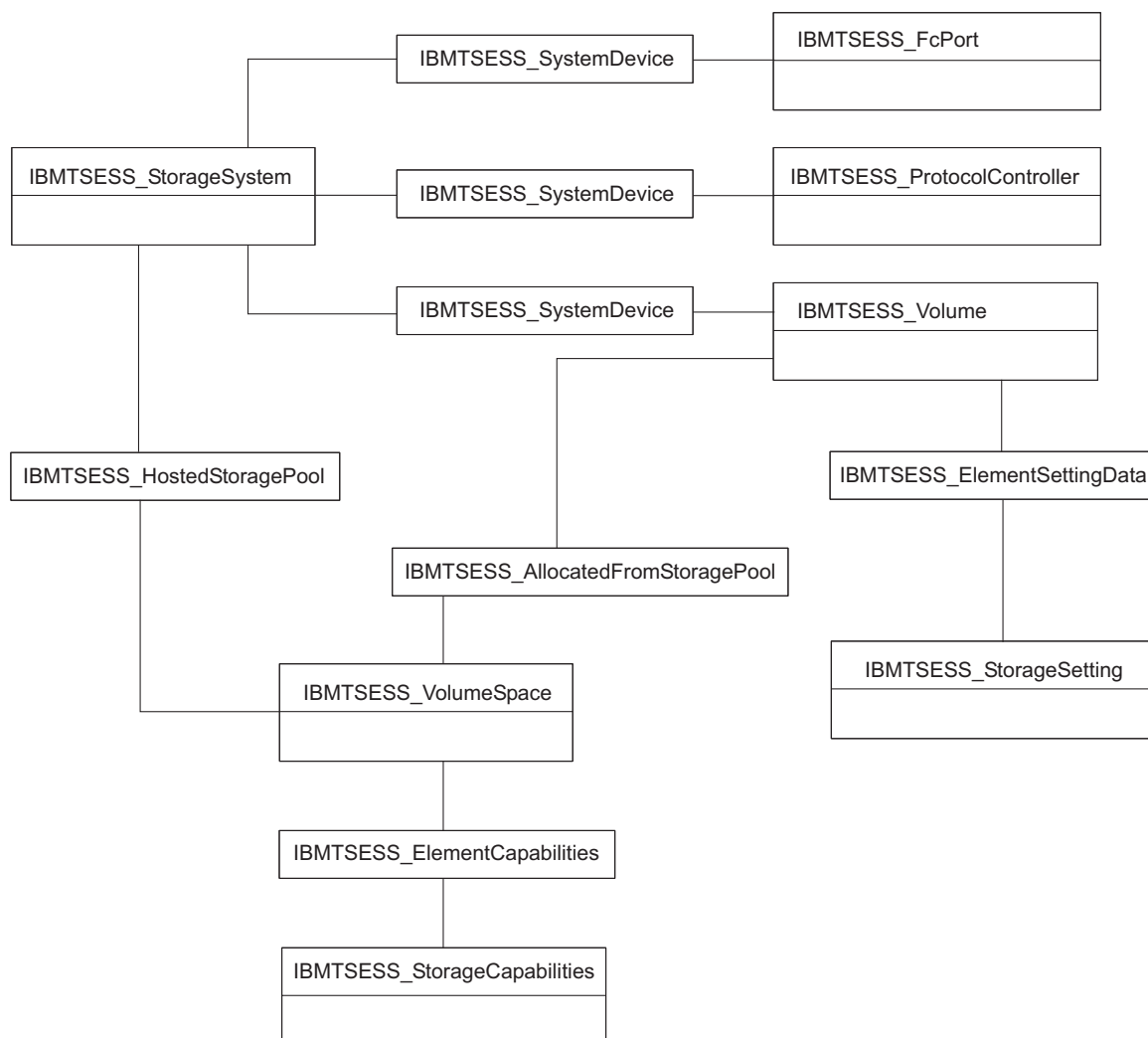


Figure 7. Array profile instance diagram

Figure 8 on page 217 shows the classes and their related associations that represent the access, addressing information, or both, for a remote connection to the ESS.

Access Point Subprofile Instance Diagram

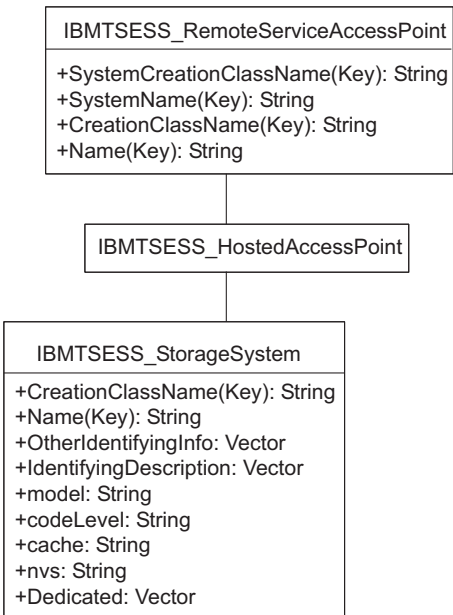


Figure 8. Access point subprofile instance diagram

| Figure 9 shows the classes and their related associations that represent the  
| aggregate elements to the ESS.

Extra Capacity Set Subprofile Instance Diagram

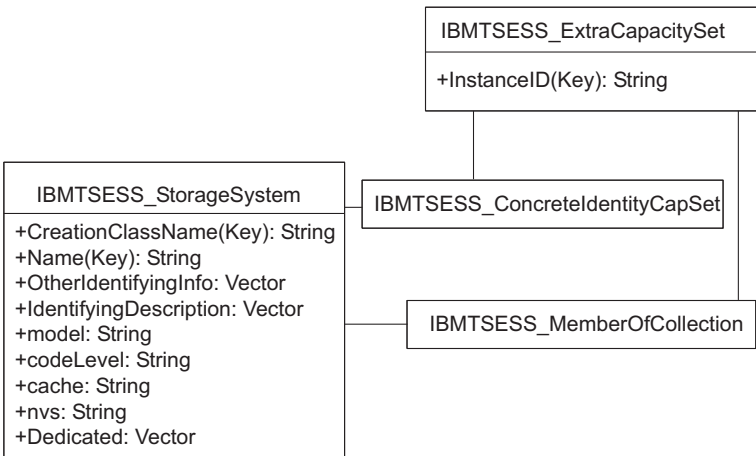


Figure 9. Extra capacity set subprofile instance diagram

| Figure 10 on page 218 shows the classes and their related associations that  
| represent the location of the disk group to the ESS.

## Location Subprofile Instance Diagram

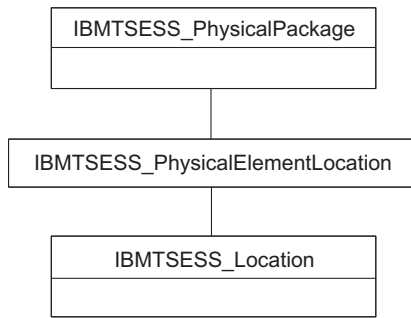


Figure 10. Location subprofile instance diagram

Figure 11 shows the classes and their related associations that represent the service control on the copy relationships to the ESS.

## Copy Services Subprofile Instance Diagram

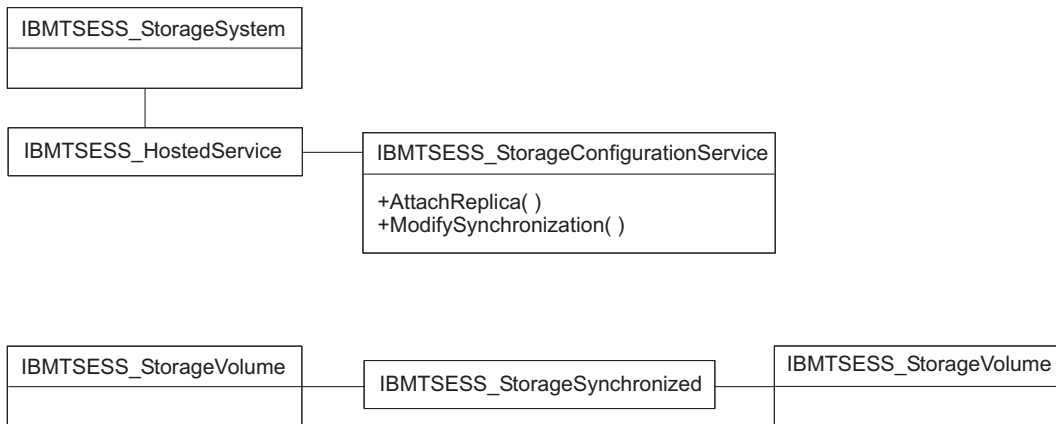


Figure 11. Copy services subprofile instance diagram

Figure 12 on page 219 shows the classes and their related associations that represent the pool manipulation to the ESS.

## Pool Manipulation, Capacity and Settings Subprofile Instance Diagram

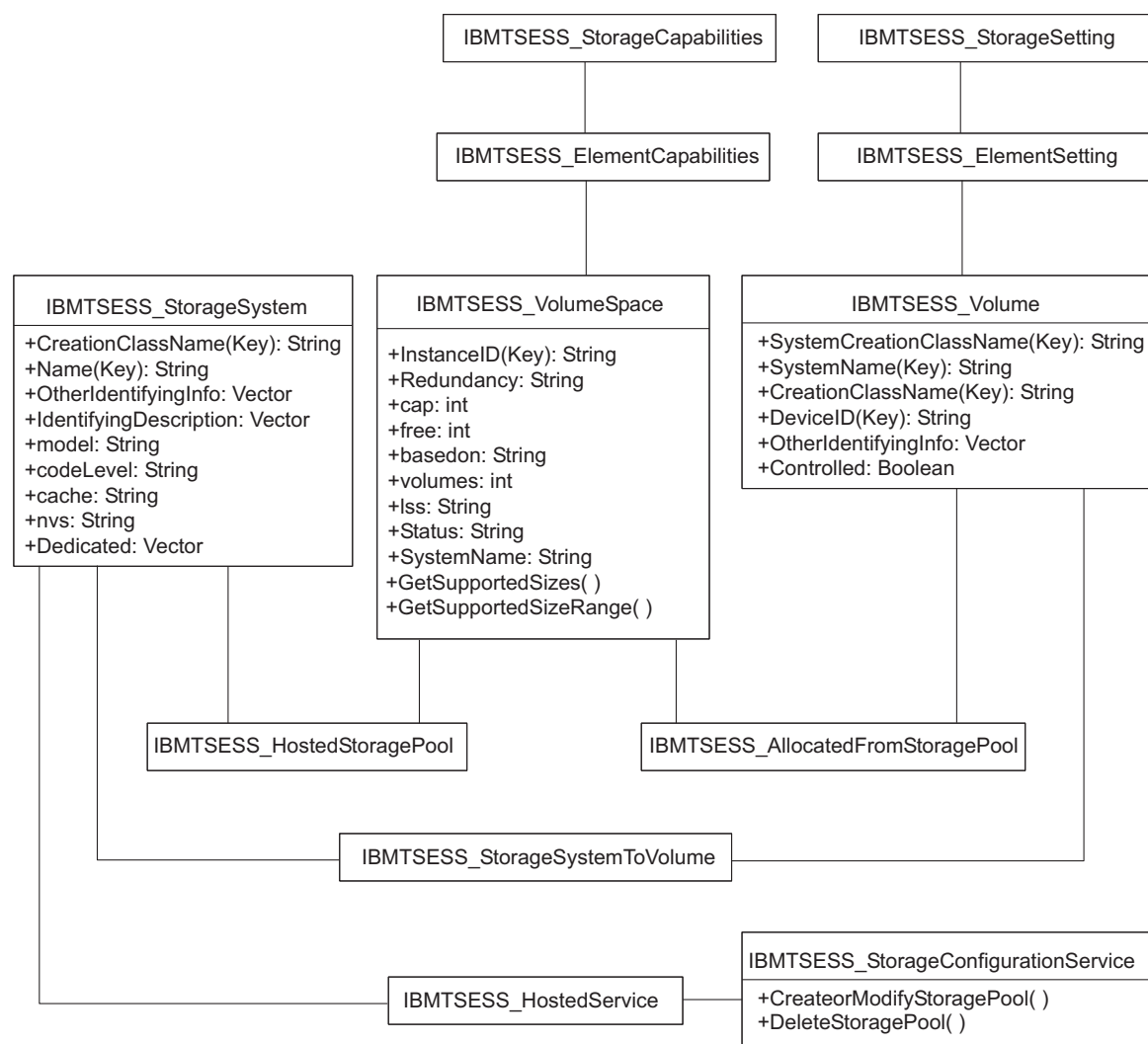


Figure 12. Pool manipulation, capacity, and settings subprofile instance diagram

Figure 13 on page 220 shows the classes and their related associations that represent the LUN Creation to the ESS.

## LUN Creation Subprofile Instance Diagram

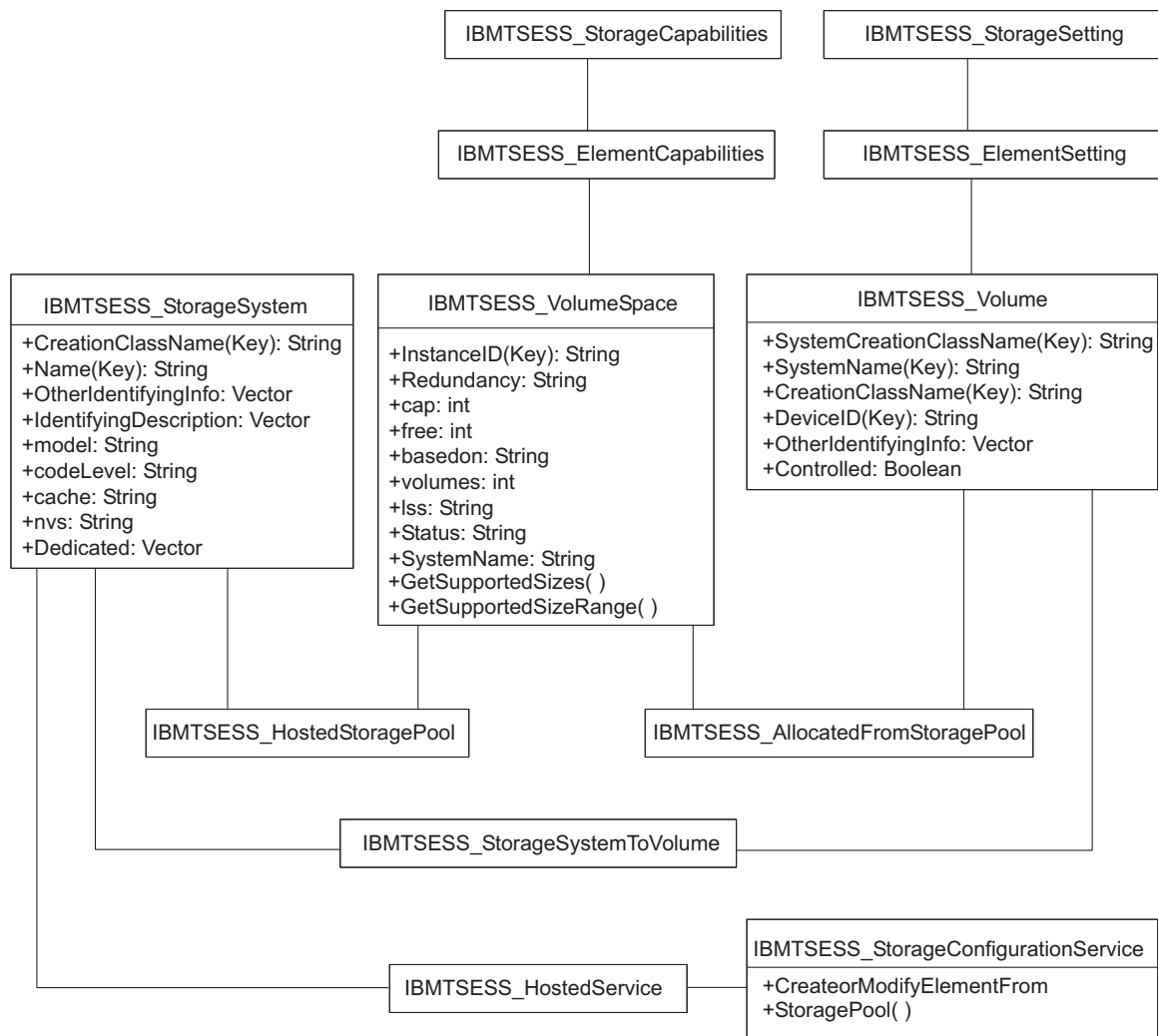


Figure 13. LUN creation subprofile instance diagram

Figure 14 on page 221 shows the classes and their related associations that represent the LUN Connectivity to the ESS.



## LUN Mapping and Mapping Subprofile Instance Diagram

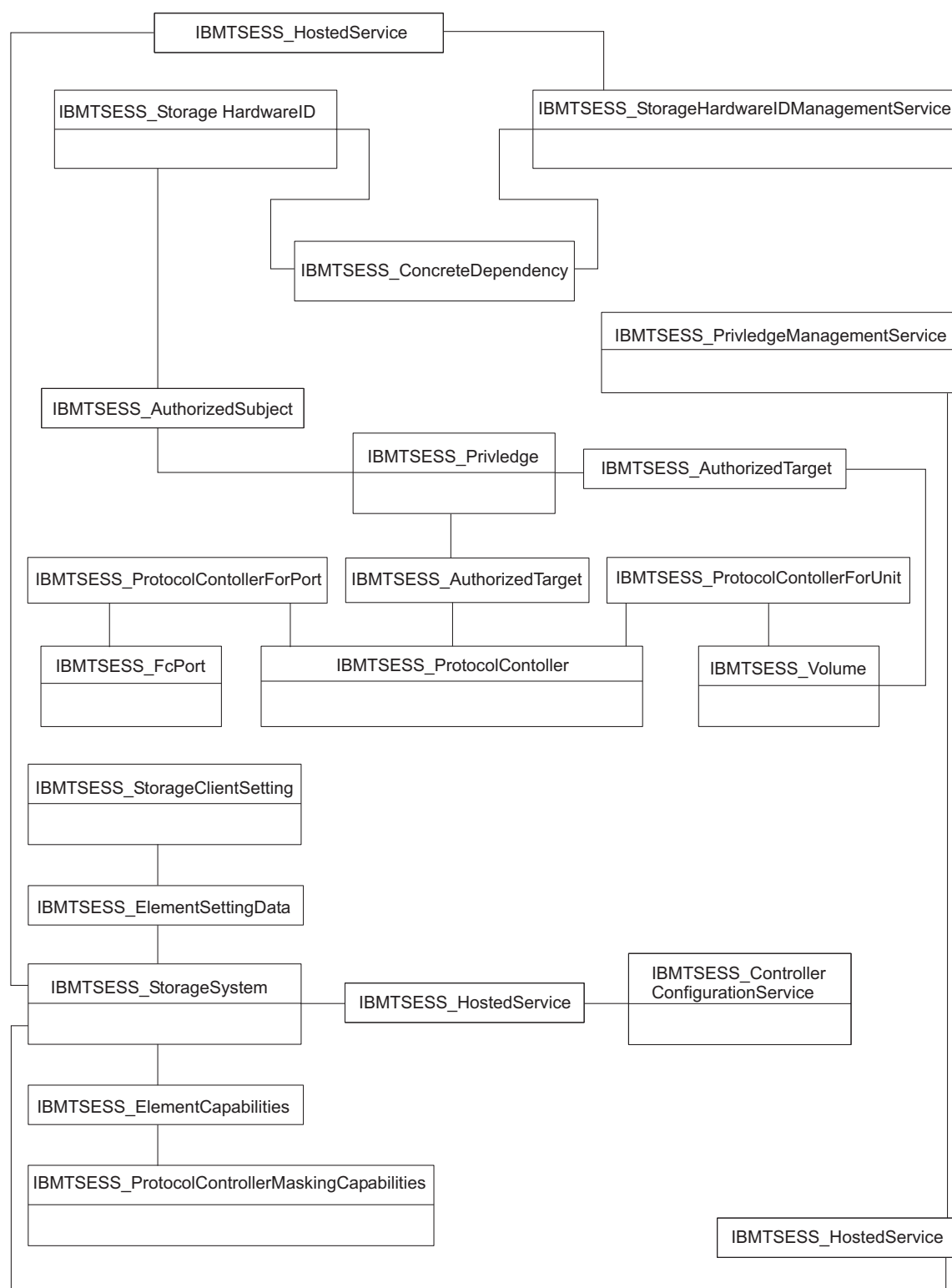


Figure 14. LUN mapping and mapping subprofile instance diagram

Figure 15 on page 222 shows the classes and their related associations that represent the VolumeSpace specific statistics to the ESS.

## Performance Extension



Figure 15. Performance extension

Figure 16 shows the classes and their related associations that represent the physical disk drive to the ESS.

## Disk drive Subprofile Instance Diagram

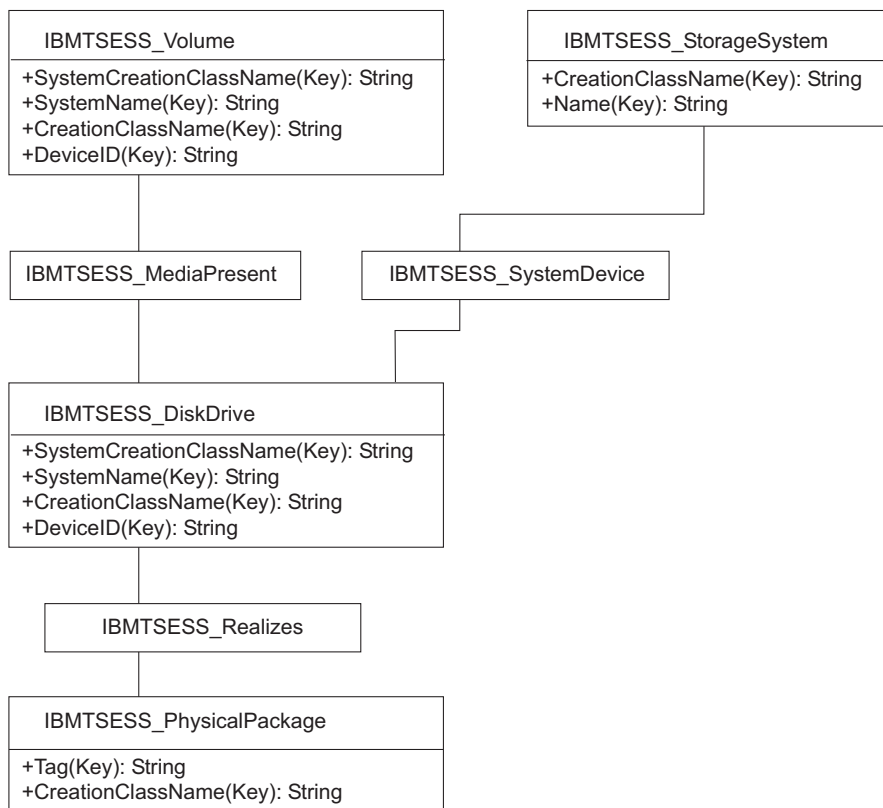


Figure 16. Disk drive subprofile instance diagram

### Related topics:

- “ESS API class definitions” on page 145
- “CIM Agent communication concepts” on page 123
- Appendix A, “ESS API component definitions,” on page 121
- “CIM Agent Communication methods” on page 124
- “Error codes returned by the CIMOM” on page 135

---

## Appendix D. ESS API support for Microsoft Volume Shadow Copy Service for Windows

This chapter includes an overview of ESS API support for Microsoft Volume Shadow Copy Service along with an overview of the installation process, and instructions for installing and reconfiguring Microsoft Volume Shadow Copy Service on a Windows Server 2003 operating system. Instructions for uninstalling Microsoft Volume Shadow Copy Service are also provided.

---

### ESS API Support for Microsoft's Volume Shadow Copy Service Overview

**Note:** See the IBM TotalStorage ESS Interoperability Web site for the availability of Microsoft Volume Shadow Copy Service.

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

The ESS API support for Microsoft Volume Shadow Copy Service enables users to quickly back up and restore large amounts of data on Windows Server 2003. Microsoft Volume Shadow Copy Service coordinates with a provider and the Enterprise Storage Server (ESS) to create a consistent shadow copy of a volume or group of volumes at a point-in-time. Point-in-time shadow copies ensure consistency for Microsoft Volume Shadow Copy Service-aware writers, and also works with applications that do not support Microsoft Volume Shadow Copy Service technology. The shadow copy can be created while the volume is mounted and files are in use.

In order to accomplish this fast backup, a backup application initiates a shadow copy backup. Microsoft Volume Shadow Copy Service then coordinates with the Microsoft Volume Shadow Copy Service writers to briefly hold writes on the databases, applications, or both. Next, Microsoft Volume Shadow Copy Service flushes the file system buffers and asks a provider to initiate a FlashCopy of the data. Once the FlashCopy is logically complete, Microsoft Volume Shadow Copy Service allows writes to resume and notifies the requestor that the backup has completed successfully. Currently, there are only requestors available to support snapshots of basic disks.

The volumes are then mounted hidden and read-only, to be used when rapid restore is necessary. Alternatively, the volumes can be mounted on a different host and used for application testing or backup to tape.

You must install the IBM TotalStorage Common Information Model Agent (CIM Agent), a middleware application that provides a CIM-compliant interface, before installing Microsoft Volume Shadow Copy Service. The Microsoft Volume Shadow Copy Service uses the CIM technology to manage proprietary devices as open system devices through storage management applications.

Microsoft Volume Shadow Copy Service is supported on ESS Fxx and 800 models, version 2.3.x.x, or later.

---

## ESS API support for Microsoft Volume Shadow Copy Service installation overview

This section provides an overview of the installation and configuration of Microsoft Volume Shadow Copy Service on a Windows Server 2003 operating system. You should have some knowledge of how to administer a Windows Server 2003 operating system before you install Microsoft Volume Shadow Copy Service. You should also become familiar with the installation tasks and gather all of the information you will need for installation ahead of time.

The following installation tasks are presented in the order in which they should be performed:

1. Before you install Microsoft Volume Shadow Copy Service for Windows, check the hardware and software requirements listed in “ESS API support for Microsoft Volume Shadow Copy Service installation requirements.”
2. Install the prerequisite ESS CIM Agent software, as instructed in Chapter 4, “ESS CIM Agent for Windows,” on page 59.
3. Run the InstallShield Wizard for Microsoft Volume Shadow Copy Service by performing the instructions in “Installing ESS API support for Microsoft Volume Shadow Copy Service on Windows” on page 225.
4. Verify the installation by performing the instructions in “Verifying ESS API support for Microsoft Volume Shadow Copy Service Windows installation” on page 234.
5. Create Free and Reserved Volume Pools in “Creating the VSS\_FREE and VSS\_RESERVED pools” on page 235.
6. Reconfigure Microsoft Volume Shadow Copy Service by using the commands in “ESS API support for Microsoft Volume Shadow Copy Service reconfiguration commands” on page 236. Perform this optional task if you would like to change the configuration that you established during installation.

---

## ESS API support for Microsoft Volume Shadow Copy Service installation requirements

Ensure that your system satisfies the following prerequisites for installing Microsoft Volume Shadow Copy Service on a Windows Server 2003 operating system before you start the installation.

You must install the ESS CIM Agent *before* you install Microsoft Volume Shadow Copy Service. You can locate the CIM Agent on the same machine as Microsoft Volume Shadow Copy Service or on a different machine.

**Attention:** Before you start the installation of the ESS CIM Agent, all prerequisite software must be installed. The ESS CIM Agent installation program will check for the existence of the ESS CLI. If the program does not detect the ESS CLI, the installation of the ESS CIM Agent will not complete successfully.

### Hardware

The following hardware is required:

- ESS Models 800 and Fxx, version 2.3.x.x or higher with FlashCopy Version 1 or FlashCopy Version 2

**Note:** If you are using Fxx models, at least one of the of the ESSs in the environment must be a model 800. Do not attach more than one ESS to your Microsoft Volume Shadow Copy Service machine.

- Systems capable of running Windows Server 2003. The following editions of Windows Server 2003 are supported:
  - Standard Edition
  - Enterprise Edition, 32-bit version
  - Datacenter Edition, 32-bit version

For details about system requirements, see

<http://www.microsoft.com/windowsserver2003/evaluation/sysreqs/default.mspx>

- Supported QLogic or Emulex Fibre Channel Host Bus Adapter (HBA) with support for the SNIA HBA Application Programming Interface.

**Note:** You must define all host machine HBAs on the ESS Specialist. If you do not, ESS API support for Microsoft Volume Shadow Copy Service might fail upon shadow volume location or import.

## Software

The following software is required:

- Windows Server 2003 operating system. The following editions of Windows Server 2003 are supported:
  - Standard Edition
  - Enterprise Edition, 32-bit version
  - Datacenter Edition, 32-bit version
- Common Information Model (CIM) Agent. The CIM Agent can be located on the same machine as Microsoft Volume Shadow Copy Service or a different machine. You can find this software on the *IBM TotalStorage Enterprise Storage Server (ESS) Application Programming Interface CD1- IBM TotalStorage CIM Agent for ESS CD*.
- Microsoft Volume Shadow Copy Service compliant backup software

---

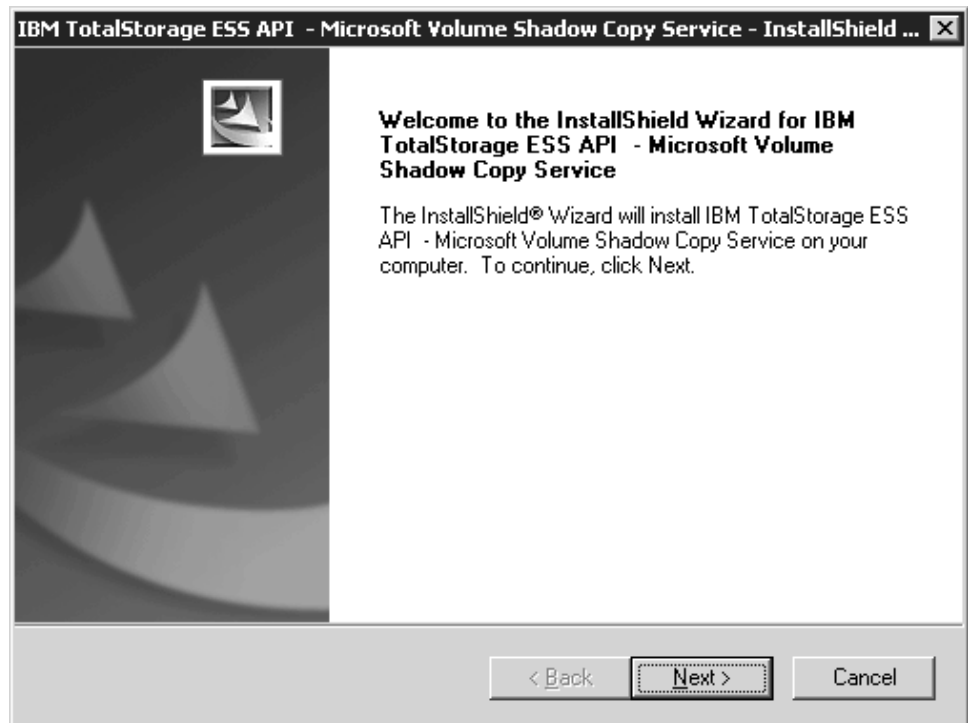
## Installing ESS API support for Microsoft Volume Shadow Copy Service on Windows

This section includes the steps to install ESS API support for Microsoft Volume Shadow Copy Service in your Windows system. You must satisfy all prerequisites that are listed in “Installing the ESS CIM Agent on Windows in unattended (silent) mode” on page 69 before you start the installation.

### Steps:

Perform the following steps to install Microsoft Volume Shadow Copy Service:

1. Log on to your system as the local administrator.
2. Run the InstallShield Wizard by inserting the *IBM TotalStorage Enterprise Storage Server (ESS) Application Programming Interface - Microsoft Volume Shadow Copy Service CD* into the CD-ROM drive
3. Click **Next** to continue with the InstallShield Wizard.

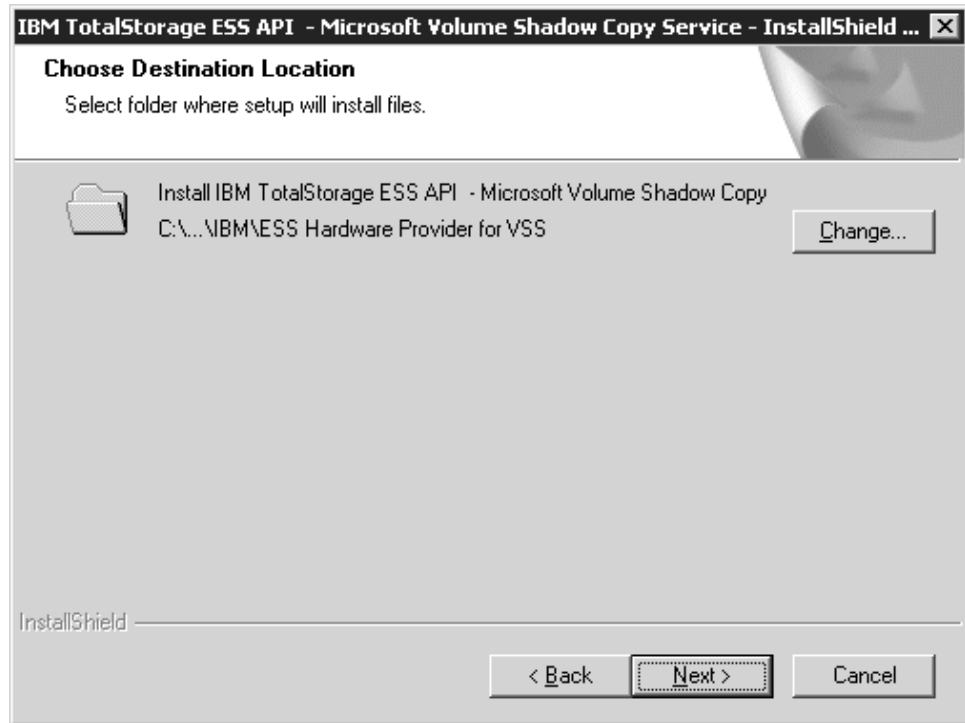


4. The License Agreement window opens. Select whether you accept the terms of the license agreement and click **Next**. If you do not accept, you cannot continue with the installation.

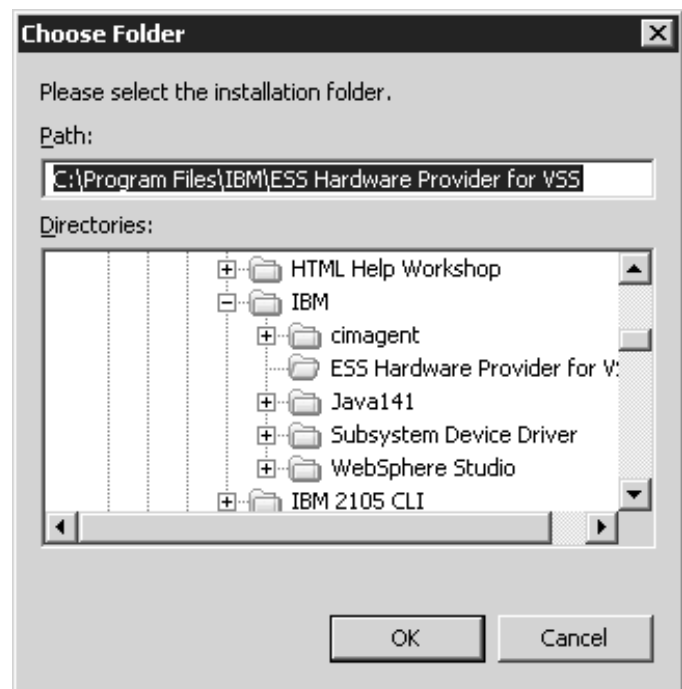


5. The Choose Destination Location Window opens. If you do not want to choose the default destination location where setup will install the files, click **Change**.

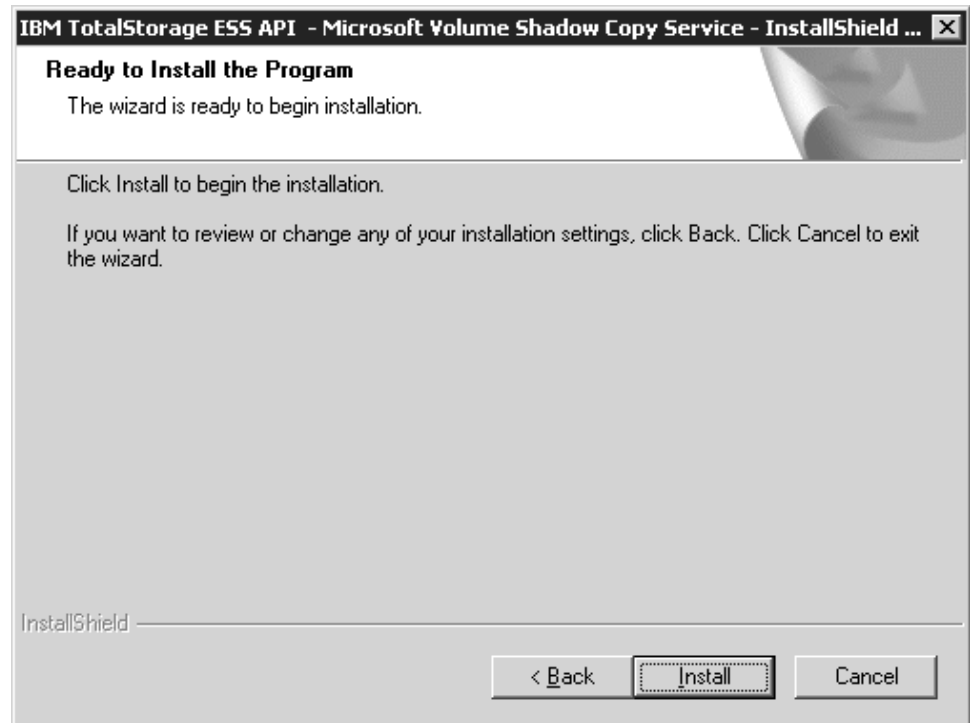
Otherwise, click **Next** to choose the default destination location where the setup will install the files.



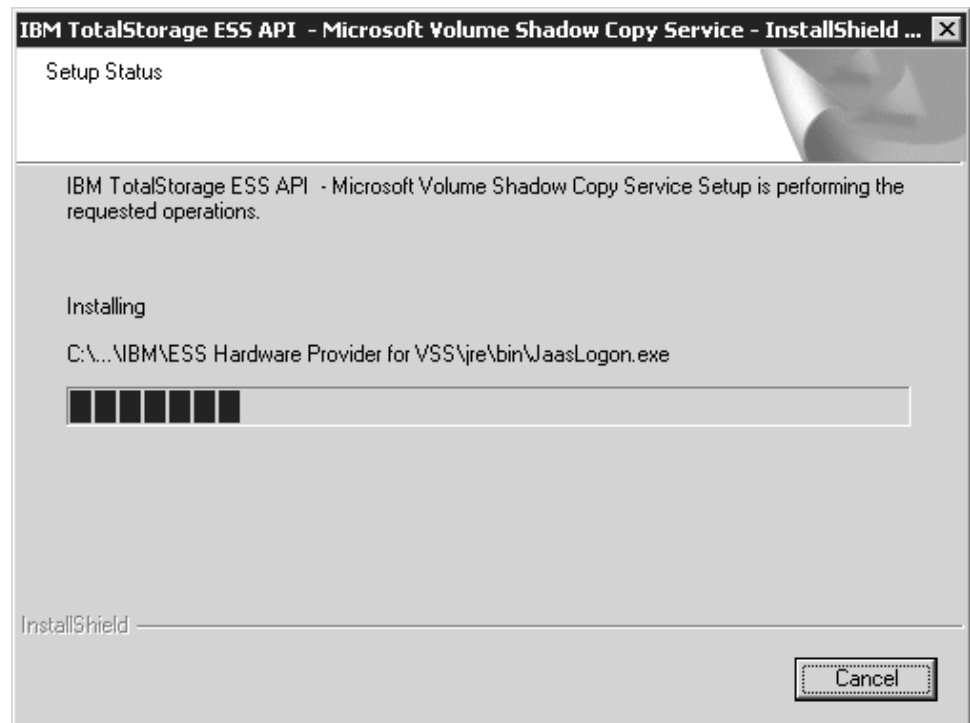
If you clicked on **Change**, the Choose Folder window opens. Choose a destination location where you want the setup to install the files and click **OK**. Click **Next** in the Choose Destination Location Window.



6. The Ready to Install the Program window opens. Click **Install** to begin the installation. To cancel the install setup, click **Cancel**.



The Setup Status window opens. Click **Cancel** if you want to stop the setup.



7. The Edit Data window opens. In order to connect to Installation and Configuration Automation Tool (ICAT), Microsoft Volume Shadow Copy Service



must know some information about the server that ICAT is installed on. Type the required ICAT 1.2 port, host, and user information and click **Next**.

**Notes:**

- a. If these settings change after installation, you can use the *ibmvssconfig.exe* tool to update Microsoft Volume Shadow Copy Service with the new settings.
- b. If you do not have the ICAT 1.2 port, host, or user information, contact your ICAT administrator.

IBM TotalStorage ESS API - Microsoft Volume Shadow Copy Service - InstallShield ...

**Edit Data**  
Enter requested data.

This product requires the IBM ICAT 1.2 or later. Please enter the following information about the ICAT.

ICAT Host:

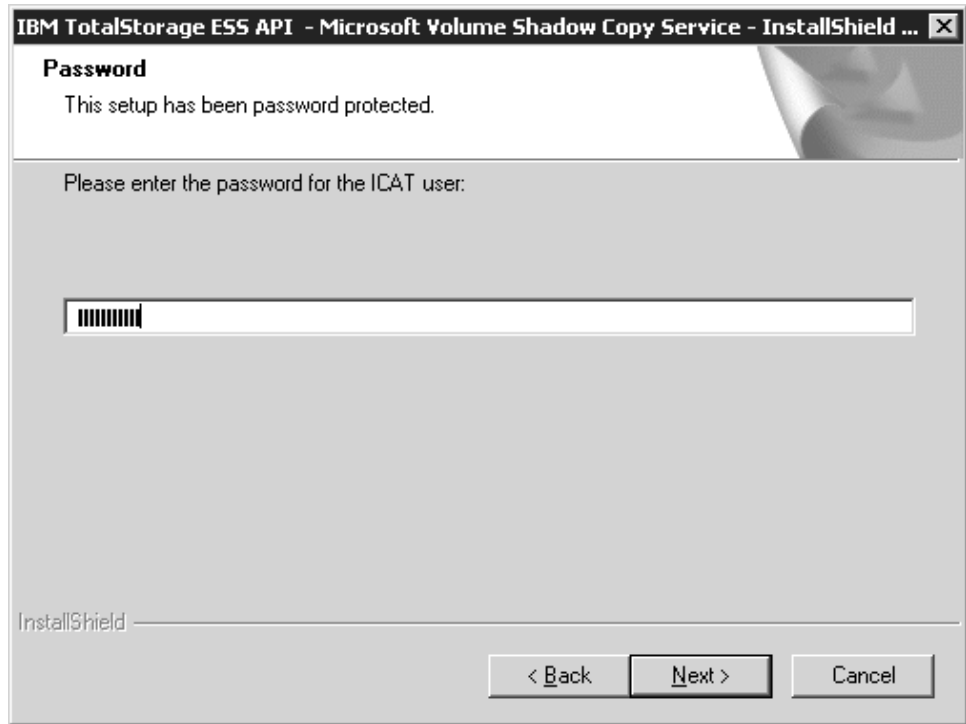
ICAT Port:

ICAT User:

InstallShield

< Back   Next >   Cancel

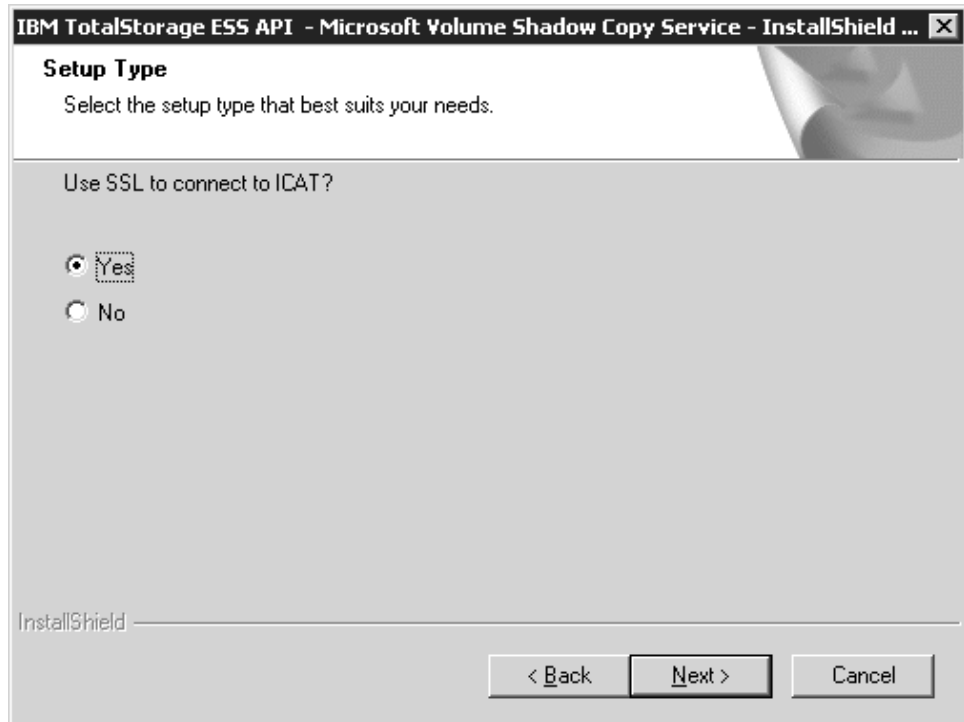
8. The Password window opens. Enter your ICAT 1.2 password and click **Next**.



9. The Setup Type window opens. Select whether you want to use Secure Sockets Layer (SSL) to connect to ICAT 1.2 and click **Next**.

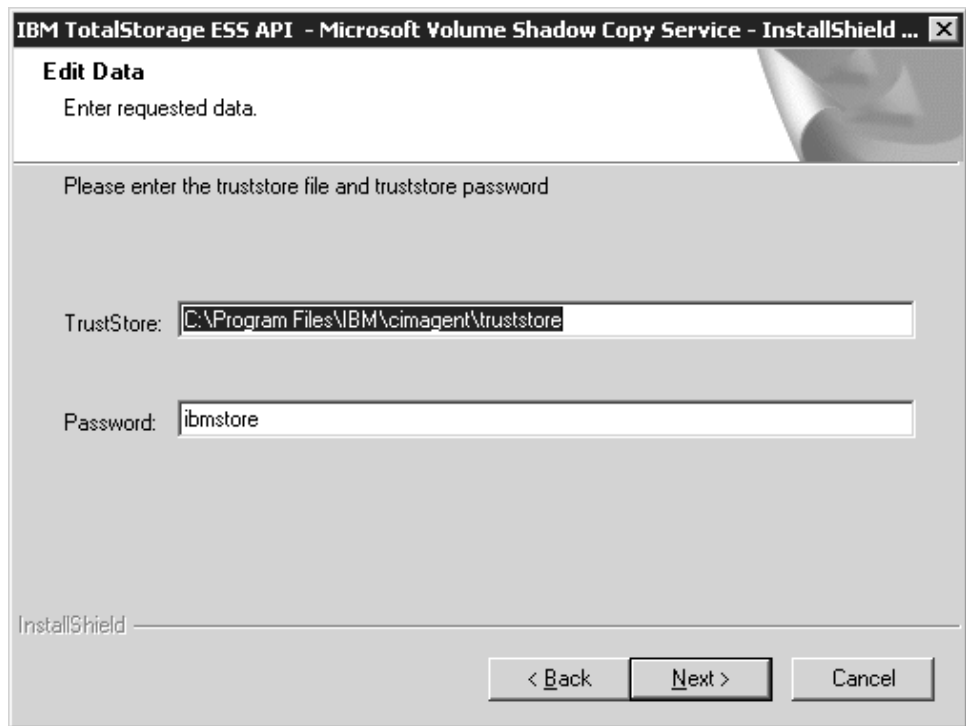
**Notes:**

- a. You can set the SSL using the *ibmvssconfig.exe* configuration tool.
- b. If you are not sure whether to use SSL to connect to ICAT 1.2, contact your ICAT administrator.

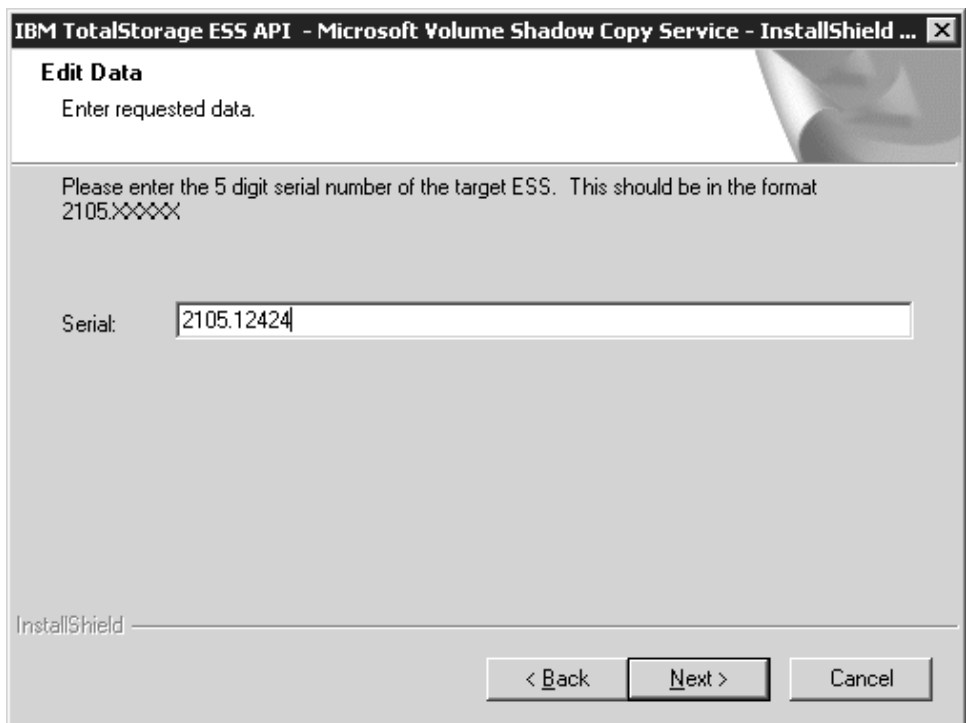


10. The Edit Data window opens. Type the location of the ICAT truststore file. This truststore is generated during ICAT installation. You must copy this file to a location accessible by Microsoft Volume Shadow Copy Service. Then type the truststore password and click **Next**

**Note:** The default ICAT truststore password is “ibmstore”. If the ICAT truststore password has been changed from the default and you do not have this information, contact your ICAT administrator. You can change the ICAT truststore password using the *ibmvssconfig.exe* configuration tool.

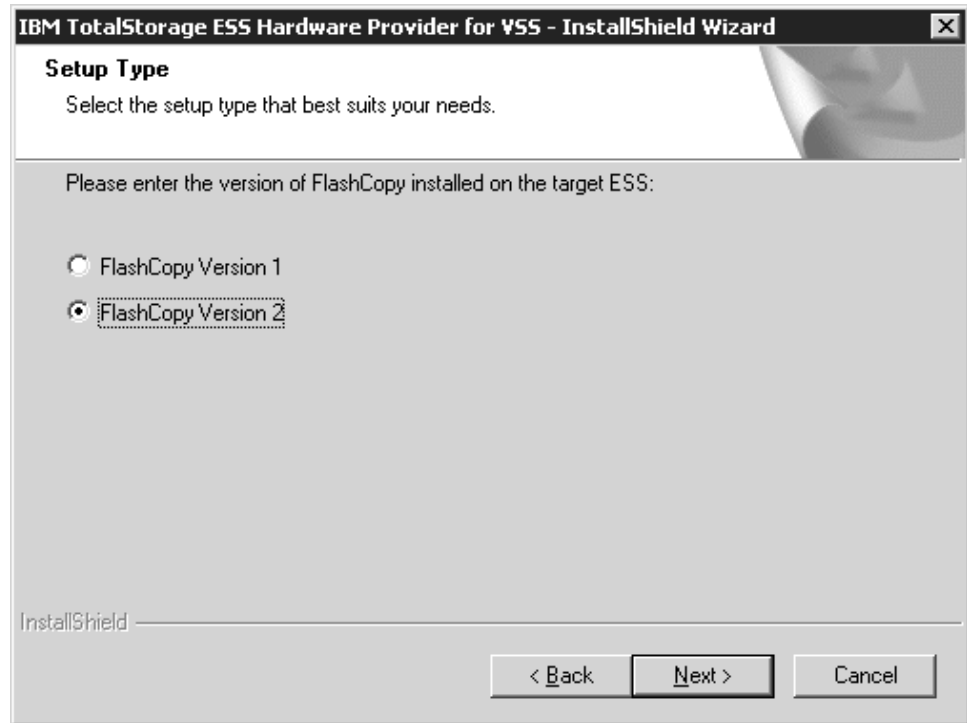


11. The Edit Data window opens. Type the ESS serial number and click **Next**.

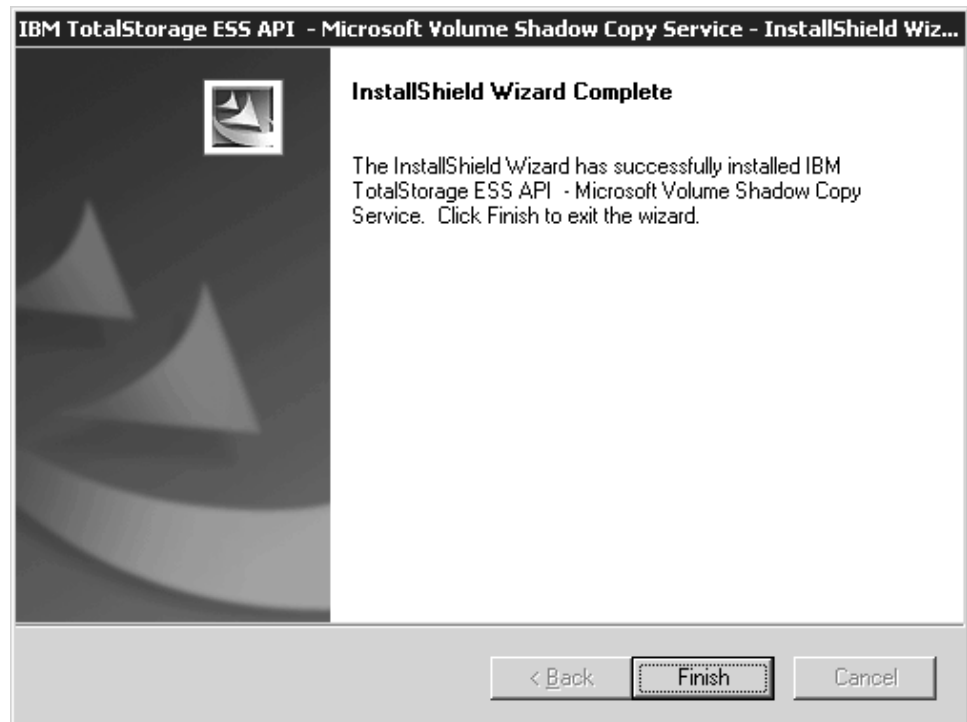


12. The Setup Type window opens. Select the version of FlashCopy that is installed on your machine and click **Next**.

**Note:** This information can be found on the License Internal Code panel in the ESS Specialist.



13. The InstallShield Wizard Complete window opens. Click **Finish**. The InstallShield Wizard is complete.



14. The installation program might prompt you to reboot your system.

**Result:**

If you are able to perform all of the installation tasks successfully, Microsoft Volume Shadow Copy Service has been successfully installed on your Windows system.

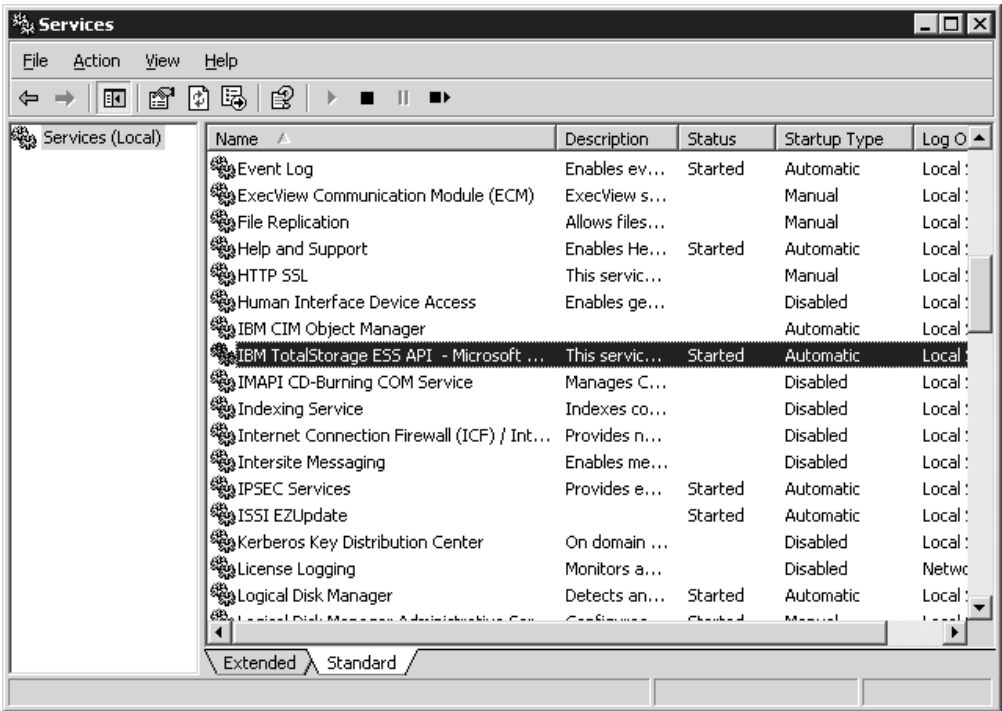
**Verifying ESS API support for Microsoft Volume Shadow Copy Service Windows installation**

This task verifies that Microsoft Volume Shadow Copy Service is installed correctly on your Windows system.

**Steps:**

Perform the following steps to verify your Microsoft Volume Shadow Copy Service installation:

- 1. Select **Start -> All Programs -> Administrative Tools -> Services**
- 2. Ensure that there is a service named IBM TotalStorage ESS Hardware Provider for VSS (Short name: IBMVSS) and that the Status is Started and the Startup Type is Automatic.



- 3. Open a command prompt window and type the following command to verify that Microsoft Volume Shadow Copy Service is installed:

```
vssadmin list providers
```

If Microsoft Volume Shadow Copy Service is installed, IBMVssProv is listed as a provider.

**Result:**

If you are able to perform all of the verification tasks successfully, Microsoft Volume Shadow Copy Service has been successfully installed on your Windows system.

---

## Creating the VSS\_FREE and VSS\_RESERVED pools

This task allows you to create the VSS\_FREE and VSS\_RESERVED pools.

A provider uses a pre-defined "free pool" of volumes as potential FlashCopy targets. Once the volumes are in use, Microsoft Volume Shadow Copy Service places these volumes in the "reserved pool." These pools can be created using either the ESS Specialist or the ESS CLI.

### Steps:

Perform the following steps using the IBM TotalStorage ESS Specialist to create the VSS\_FREE and VSS\_RESERVED pools:

1. Create a virtual host on the ESS named "VSS\_FREE", of type Microsoft Windows, attached by Fibre Channel with a WWPN of 5000000000000000.
2. Create a virtual host on the ESS named "VSS\_RESERVED", of type Microsoft Windows, attached by Fibre Channel with a WWPN of 5000000000000001.
3. Create and assign free volumes to VSS\_FREE.

**Note:** If you already have volumes created for VSS\_FREE, you must assign those volumes to VSS FREE.

---

## Verifying ESS API support for Microsoft Volume Shadow Copy Service Windows configuration

This task verifies that Microsoft Volume Shadow Copy Service is configured correctly on your Windows system.

### Steps:

After you have installed Microsoft Volume Shadow Copy Service and created the VSS\_FREE and VSS\_RESERVED pools, perform the following steps to verify your configuration:

1. Issue the following command:

```
ibmvssconfig.exe list
```

All of the volumes on your ESS should be listed with the WWPNs they are assigned to.

2. If the volumes are not listed, check the connectivity of your ESS CIM Agent. Then, check your ESS API support for Microsoft Volume Shadow Copy Service configuration. You can reconfigure using the commands that are listed in the next section. The ESSService.log provides more detailed information on which setting is incorrect. ESS API support for Microsoft Volume Shadow Copy Service will not work if this command does not succeed.

### Result:

If you are able to perform all of the verification tasks successfully, Microsoft Volume Shadow Copy Service has been successfully configured on your Windows system.

## ESS API support for Microsoft Volume Shadow Copy Service reconfiguration commands

This section introduces the ESS VSS Provider reconfiguration commands and provides examples of how to use the commands.

### Commands:

After installation, you can use several commands on the `ibmvssconfig.exe` tool to change or correct parameters that you used to install the Microsoft Volume Shadow Copy Service. To do this, you must use the utility `ibmvssconfig.exe`. You do not have to set many of the settings because there are defaults provided for them in Microsoft Volume Shadow Copy Service. Table 99 shows the commands you can use for reconfiguration.

**Note:** If you do not know which settings to provide (for example, passwords or user names) for the following commands, contact your system administrator.

Table 99. Microsoft Volume Shadow Copy Service reconfiguration commands

| Command                                                        | Description                                                                                                                                                                 | Example                                                                                                                                                                  |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>ibmvssconfig showcfg</code>                              | Provides the current settings.                                                                                                                                              |                                                                                                                                                                          |
| <code>ibmvssconfig listvols</code>                             | Lists the volumes that are currently in the freepool, unassigned, or all volumes. By default, without any additional parameters, this command will list all of the volumes. | <code>ibmvssconfig listvols</code><br><code>ibmvssconfig listvols free</code><br><code>ibmvssconfig listvols unassigned</code><br><code>ibmvssconfig listvols all</code> |
| <code>ibmvssconfig listvols free</code>                        | Lists the volumes that are currently in the freepool, volumes that are unassigned, or both.                                                                                 | <code>ibmvssconfig listvols free</code>                                                                                                                                  |
| <code>ibmvssconfig listvols unassigned</code>                  | Lists the volumes that are currently in the freepool, volumes that are unassigned, or both.                                                                                 | <code>ibmvssconfig listvols unassigned</code>                                                                                                                            |
| <code>ibmvssconfig add</code>                                  | Adds a volume or volumes to the freepool.                                                                                                                                   | <code>ibmvssconfig add 12312345 32112345</code>                                                                                                                          |
| <code>ibmvssconfig rem</code>                                  | Removes a volume or volumes from the freepool.                                                                                                                              | <code>ibmvssconfig rem 512</code><br><code>ibmvssconfig rem 51212345</code>                                                                                              |
| <code>ibmvssconfig set targetESS &lt;5-digit ESS Id&gt;</code> | Changes the ESS identification number, usually seen in the form of 2105.xxxxx. Obtain this number by telnetting to your ESS.                                                | <code>ibmvssconfig set targetESS 12345</code>                                                                                                                            |



Table 99. Microsoft Volume Shadow Copy Service reconfiguration commands (continued)

| Command                                           | Description                                                                                                                                                                                        | Example                                                |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| ibmvssconfig set username <CIMOM username>        | Sets the CIMOM user name.                                                                                                                                                                          | ibmvssconfig set username johnny                       |
| ibmvssconfig set password <CIMOM password>        | Sets the CIMOM user password.                                                                                                                                                                      | ibmvssconfig set password mypassword                   |
| ibmvssconfig set trustpassword <trustpassword>    | Sets the CIMOM trust password.                                                                                                                                                                     | ibmvssconfig set trustpassword trustme                 |
| ibmvssconfig set truststore <truststore location> | Specifies the truststore file location.                                                                                                                                                            | ibmvssconfig set truststore c:\truststore              |
| ibmvssconfig set usingSSL                         | Specifies whether to use Secure Socket Layers to connect to the CIMOM.                                                                                                                             | ibmvssconfig set usingSSL yes                          |
| ibmvssconfig set vssFreeInitiator <WWPN>          | Specifies the WWPN that designates the freepool. The default value is 5000000000000000. Modify this value only if there is a host already in your environment with a WWPN of 5000000000000000.     | ibmvssconfig set vssFreeInitiator 5000000000000000     |
| ibmvssconfig set vssReservedInitiator <WWPN>      | Specifies the WWPN that designates the reservedpool. The default value is 5000000000000001. Modify this value only if there is a host already in your environment with a WWPN of 5000000000000001. | ibmvssconfig set vssReservedInitiator 5000000000000001 |
| ibmvssconfig set FlashCopyVer <1   2>             | Sets the FlaschCopy version available on the ESS. The default value is 1.                                                                                                                          | ibmvssconfig set FlashCopyVer 1                        |
| ibmvssconfig set cimomPort <PORTNUM>              | Specifies the CIMOM port number. The default value is 5989.                                                                                                                                        | ibmvssconfig set cimomPort 5989                        |
| ibmvssconfig set cimomHost <server name>          | Sets the name of the ICAT server.                                                                                                                                                                  | ibmvssconfig set cimomHost icatserver                  |
| ibmvssconfig set namespace <Namespace>            | Specifies the namespace value that CIMOM is using. The default value is \root\ibm.                                                                                                                 | ibmvssconfig set namespace \root\ibm                   |

## Error codes returned by Microsoft Volume Shadow Copy Service

This section identifies the possible error codes that are returned by Microsoft Volume Shadow Copy Service.

### Return Error Codes:

Table 3 lists Microsoft Volume Shadow Copy Service error codes.

**Note:** These errors are logged in the Windows Event Monitor and in the Microsoft Volume Shadow Copy Service log file located in the installation directory.

*Table 100. Return error codes for Microsoft Volume Shadow Copy Service*

| Symbolic Name                      | Code | Definition                                                                                |
|------------------------------------|------|-------------------------------------------------------------------------------------------|
| ERR_JVM                            | 1000 | JVM Creation failed.                                                                      |
| ERR_CLASS_NOT_FOUND                | 1001 | Class not found: %1.                                                                      |
| ERR_MISSING_PARAMS                 | 1002 | Some required parameters are missing.                                                     |
| ERR_METHOD_NOT_FOUND               | 1003 | Method not found: %1.                                                                     |
| ERR_REQUIRED_PARAM                 | 1004 | A missing parameter is required. Use the configuration utility to set this parameter: %1. |
| ERR_RECOVERY_FILE_CREATION_FAILED  | 1600 | The recovery file could not be created.                                                   |
| ERR_ARELUNSSUPPORTED_IBMGETLUNINFO | 1700 | ibmGetLunInfo failed in AreLunsSupported.                                                 |
| ERR_FILLLUNINFO_IBMGETLUNINFO      | 1800 | ibmGetLunInfo failed in FillLunInfo.                                                      |
| ERR_GET_TGT_CLEANUP                | 1900 | Failed to delete the following temp files: %1                                             |
| ERR_LOG_SETUP                      | 2500 | Error initializing log.                                                                   |
| ERR_CLEANUP_LOCATE                 | 2501 | Unable to search for incomplete Shadow Copies. Windows Error: %1.                         |
| ERR_CLEANUP_READ                   | 2502 | Unable to read incomplete Shadow Copy Set information from file: %1.                      |
| ERR_CLEANUP_SNAPSHOT               | 2503 | Unable to cleanup snapshot stored in file: %1.                                            |
| ERR_CLEANUP_FAILED                 | 2504 | Cleanup call failed with error: %1.                                                       |
| ERR_CLEANUP_OPEN                   | 2505 | Unable to open file: %1.                                                                  |
| ERR_CLEANUP_CREATE                 | 2506 | Unable to create file: %1.                                                                |
| ERR_HBAAPI_LOAD                    | 2507 | HBA: Error loading hba library: %1.                                                       |

Table 100. Return error codes for Microsoft Volume Shadow Copy Service (continued)

| Symbolic Name                       | Code | Definition                                                                                |
|-------------------------------------|------|-------------------------------------------------------------------------------------------|
| ERR_ESSSERVICE_EXCEPTION            | 3000 | ESSService: An exception occurred. Check the ESSService log.                              |
| ERR_ESSSERVICE_LOGGING              | 3001 | ESSService: Unable to initialize logging.                                                 |
| ERR_ESSSERVICE_CONNECT              | 3002 | ESSService: Unable to connect to the ICAT. Check your configuration.                      |
| ERR_ESSSERVICE_SCS                  | 3003 | ESSService: Unable to get the Storage Configuration Service. Check your configuration.    |
| ERR_ESSSERVICE_INTERNAL             | 3004 | ESSService: An internal error occurred with the following information: %1.                |
| ERR_ESSSERVICE_FREE_CONTROLLER      | 3005 | ESSService: Unable to find the VSS_FREE controller.                                       |
| ERR_ESSSERVICE_RESERVED_CONTROLLER  | 3006 | ESSService: Unable to find the VSS_RESERVED controller. Check your configuration.         |
| ERR_ESSSERVICE_INSUFFICIENT_TARGETS | 3007 | Unable to find suitable targets for all volumes.                                          |
| ERR_ESSSERVICE_ASSIGN_FAILED        | 3008 | ESSService: The assign operation failed. Check the ICAT log for details.                  |
| ERR_ESSSERVICE_WITHDRAW_FAILED      | 3009 | ESSService: The withdraw FlashCopy operation failed. Check the ICAT log for details.      |
| ERR_JVM                             | 1000 | JVM Creation failed.                                                                      |
| ERR_CLASS_NOT_FOUND                 | 1001 | Class not found: %1.                                                                      |
| ERR_MISSING_PARAMS                  | 1002 | Some required parameters are missing.                                                     |
| ERR_METHOD_NOT_FOUND                | 1003 | Method not found: %1.                                                                     |
| ERR_REQUIRED_PARAM                  | 1004 | A missing parameter is required. Use the configuration utility to set this parameter: %1. |
| ERR_RECOVERY_FILE_CREATION_FAILED   | 1600 | The recovery file could not be created.                                                   |
| ERR_ARELUNSSUPPORTED_IBMGETLUNINFO  | 1700 | ibmGetLunInfo failed in AreLunsSupported.                                                 |

Table 100. Return error codes for Microsoft Volume Shadow Copy Service (continued)

| Symbolic Name                 | Code | Definition                                                           |
|-------------------------------|------|----------------------------------------------------------------------|
| ERR_FILLLUNINFO_IBMGETLUNINFO | 1800 | ibmGetLunInfo failed in FillLunInfo.                                 |
| ERR_GET_TGT_CLEANUP           | 1900 | Failed to delete the following temp files: %1.                       |
| ERR_LOG_SETUP                 | 2500 | Error initializing log.                                              |
| ERR_CLEANUP_LOCATE            | 2501 | Unable to search for incomplete Shadow Copies. Windows Error: %1.    |
| ERR_CLEANUP_READ              | 2502 | Unable to read incomplete Shadow Copy Set information from file: %1. |

## Uninstalling ESS API support for Microsoft Volume Shadow Copy Service on Windows

This section includes the steps to uninstall the ESS API support for Microsoft Volume Shadow Copy Service in your Windows system.

### Steps:

Perform the following steps to uninstall Microsoft Volume Shadow Copy Service:

1. Log on to your system as the local administrator.
2. Click **Start -> Control Panel**.
3. The Control Panel window opens. Double-click on **Add or Remove Programs** and then select **IBM TotalStorage ESS API - Microsoft Volume Shadow Copy Service**. Click **Remove** to remove the program.
4. Select **Yes** when asked if you want to completely remove the selected application and all of its components or click **No** to go back to the Add or Remove Programs window.
5. The progress window quickly opens and closes.
6. The Finish window opens. Click **Finish**. The removal is now complete.

### Result:

If you are able to perform all of the uninstallation tasks successfully, Microsoft Volume Shadow Copy Service has been successfully uninstalled on your Windows system.

---

## Notices

This information was developed for products and services that are offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications to cover subject matter that is described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing  
IBM Corporation  
North Castle Drive  
Armonk, NY 10504-1785  
U.S.A.

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

IBM World Trade Asia Corporation  
Licensing  
2-31 Roppongi 3-chome, Minato-ku  
Tokyo 106, Japan

**The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law:**

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions; therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling:

- (i) the exchange of information between independently created programs and other programs (including this one) and
- (ii) the mutual use of the information which has been exchanged, should contact:

IBM Corporation  
Information Enabling Requests  
Dept. DZWA  
5600 Cottle Road  
San Jose CA 95193-0001  
U.S.A.

Such information may be available, subject to appropriate terms and conditions that include in some cases, payment of a fee.

The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement, or any equivalent agreement between us.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

---

## Trademarks

The following terms are trademarks of the International Business Machines Corporation in the United States, or other countries, or both:

AIX  
Enterprise Storage Server  
IBM  
TotalStorage

Lotus is a trademark of International Business Machines Corporation and Lotus Development Corporation in the United States, or other countries, or both.

Pentium is a registered trademark of the Intel Corporation in the United States, or other countries, or both.

Microsoft, Windows, and Windows 2000 are registered trademarks of Microsoft Corporation.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States and other countries.

Other company, product, and service names may be trademarks or service marks of others.

---

## Java Compatibility logo

The Java Compatibility logo identifies products that incorporate a Java application environment (JDK or JRE). These products pass the applicable, JavaSoft defined, Java Compatibility test suite in order to enable execution of Java or Personal Java (pJava) applications.







---

## Glossary

The terms in this glossary are defined as they pertain to the Common Information Model for the IBM TotalStorage Enterprise Storage Server. If you do not find a term you are looking for, you can refer to the *IBM Dictionary of Computing Terms*. A link to the Web site for this reference is listed in the following paragraph.

This glossary might include 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.
- The *IBM Glossary of Computing Terms*, which is available online at the following Web site: <http://www.ibm.com/ibm/terminology/>.
- 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).

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

**2105.** The machine number for the IBM TotalStorage Enterprise Storage Server (ESS).

## 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 control list.**

1. In computer security, a collection of all access rights for one object.
2. In computer security, a list associated with an object that identifies all the subjects that can access the object and their access rights; for example, a list associated with a file that identifies users who can access the file and identifies their access rights to that file.

**active window.** The window a user is currently interacting with.

### **address.**

1. A character or group of characters that identify a register, a particular part of storage, or some other data source or destination.
2. To refer to a device or an item of data by its address.
3. The location, identified by an address code, of a specific section of the recording medium or storage.
4. A name, label, or number identifying a location in storage, a device in a system or network, or any other data source.
5. In data communication, the unique code assigned to each device or workstation connected to a network.

**advanced.** Usually refers to the performance of functions not understood by the basic user.

**advanced interactive executive (AIX).** An operating system used in the RS/6000 computers. See also *AIX Operating System*.

**AIX.** See *advanced interactive executive*.

**AIX Operating System.** IBM's implementation of the UNIX operating system. The RISC 6000 computer, among others, runs on the AIX operating system.

**alert.** A message or log that a storage facility generates as the result of error event collection and analysis. An alert indicates that you need to perform some service action.

**alphanumeric.** Pertaining to data that consist of any letters between A through Z, and numbers between 0 through 9.

**API.** See *application programming interface*.

**American National Standard Code for Information Interchange (ASCII).** A coding scheme that is defined by ANSI X3.4-1977. Programmers use it to represent various alphabetic, numeric, and special symbols with a seven-bit code.

**American National Standards Institute (ANSI).** An organization consisting 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.

**ANSI.** See *American National Standards Institute*.

**application programming interface (API).** A software interface that enables applications to communicate with each other. An API is the set of programming language constructs or statements that can be coded in an application program to obtain the specific functions and services provided by an underlying operating system or service program. .

**applet.** A Java program designed to be run within a client's browser.

**applications.** A collection of software components used to perform specific types of user oriented work on a computer.

**application management.** The management of a collection of software components used to perform specific types of user-oriented work on a computer. Application management can improve application availability and performance, increases end-user satisfaction and productivity, lowers IT costs by streamlining problem isolation and resolution, and creates a tighter fit between IT and the business.

**ASCII.** See *American National Standard Code for Information Interchange*.

**asset management.** The organization and arrangement of items, such as storage devices, into useful and logical units.

**association.** A class that contains two references which define a relationship between two objects.

**authentication.** In secure communications, a means of verifying the identity of a server or browser (client) with whom you wish to communicate. A sender's authenticity is demonstrated by the digital certificate that is issued to the sender.

**authorized personnel.** Personnel who are permitted or given authority to communicate with or make use of an object, resource, or function.

**automated.** The use of automatic procedures to replace or simplify the actions an operator would take in response to system or network events.

**availability.** For a storage subsystem, the degree to which a data set can be accessed when requested by a user.

## B

**bit.** Binary digit. The storage medium that you need to store a single binary digit.

**block.** A group of consecutive bytes.

**boot.** To load an operating system or start the system.

**browser.** A Web client application for accessing text and images. The Web browser uses an HTTP server across a TCP/IP communication stream.

**button.**

1. A mechanism on a pointing device, such as a mouse, used to request or initiate an action.
2. A graphical device that identifies a choice.
3. A graphical mechanism in a window that, when selected, results in action; for example, a list button produces a list of choices.
4. A word or picture on the screen that can be selected. Once selected and activated, a button begins an action in the same manner that pressing a key on the keyboard can begin an action.
5. An object that performs an action, e.g., button types include Start, Go, Find, Next, Back, Cancel, Close.

**byte.** An aggregation of eight bits. The storage medium that you require in order to store eight bits.

## C

**CA.** See *certification authority*.

**CD-ROM.** High-capacity read-only memory in the form of an optically read compact disc.

**central processing unit (CPU).** The part of a computer that includes the circuits that control the interpretation and execution of instructions. A CPU is the circuitry and storage that executes instructions. Traditionally, the complete processing unit was often regarded as the CPU, whereas today the CPU is often a microchip. In either case, the centrality of a processor or processing unit depends on the configuration of the system or network in which it is used.

**certificate.** In electronic commerce, a digital document that binds an encryption key to the identity of the certificate owner, so that the certificate owner can be authenticated. A certificate is issued by a certification authority (CA).

**certification authority (CA).** In electronic commerce, a trusted third party or a designated internal authority who issues certificates.

**CIM.** See *common information model*.

**CIMOM.** See *common information model object manager*.

**class.** The definition of an object within some hierarchy. Classes can have methods and properties and be the target of an association.

**CLI.** See *command-line interface*.

**click.** To press and release a button on a mouse or other device without moving the pointer off the item of choice.

**client.** (1) A function that requests services from a server, and makes them available to the user. (2) An address space in MVS that is using TCP/IP services. (3) A term used in an environment to identify a machine that uses the resources of the network.

**client authentication.** The verification of a client in secure communications whereby the identity of a server or browser (client) with whom you wish to communicate is ascertained. A sender's authenticity is demonstrated by the digital certificate issued to the sender.

**client-server relationship.** Any process that provides resources to other processes on a network is a server. Any process that employs these resources is a client. A machine can run client processes and server processes at the same time.

**close.** A choice or command that removes a window and all its associated windows from the screen.

**command.**

1. A control signal.
2. In a conceptual schema language, the order or trigger for an action or permissible action to take place.
3. Loosely, a mathematical or logical operator.
4. A statement used to request a function of the system.
5. A request from a terminal for the performance of an operation or the execution of a particular program.

**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).

**common information model (CIM).** The common information model (CIM) is an open approach to the management of systems and networks. The CIM provides a common conceptual framework applicable to all areas of information management including systems, applications, databases, networks, and devices.

**common information model object manager (CIMOM).** A common conceptual framework for data management. The object manager receives, validates, and authenticates client application requests, then directs requests to the appropriate functional component or to a device provider.

**component.**

1. Hardware or software that is part of a functional unit.
2. A functional part of an operating system.
3. A set of modules that performs a major function within a system.
4. The widget, gadget, or other graphical object that makes up an interactive user interface.

**configuration.**

1. The manner in which the hardware and software of an information processing system are organized and interconnected.
2. The physical and logical arrangement of devices and programs that make up a computing system.
3. The devices and programs that make up a system, subsystem, or network.

**configuration management.** The control of information necessary to identify both physical and logical information system resources and their relationship to one another.

**configure.** To define the logical and physical configuration of the input/output (I/O) subsystem through the user interface provided for this function on the storage facility.

**CPU.** See *central processing unit*.

## D

**daemon .** A program that runs unattended to perform a standard service. Some daemons are triggered automatically to perform their task; others operate periodically.

**default.** Pertaining to an attribute, condition, value, or option that is assumed when none is explicitly specified.

**Desktop Management Task Force (DMTF).** An alliance of computer vendors that was convened to define streamlined management of the diverse operating systems commonly found in an enterprise.

**device.**

1. A mechanical, electrical, or electronic contrivance with a specific purpose.
2. A storage server, such as the ESS, that is the final destination of a client application request, and the processor of the request.
3. In the AIX operating system, a valuator, button, or the keyboard. Buttons have values of 0 or 1 (up or

down); valuator returns values in a range, and the keyboard returns ASCII values.

**device adapter (DA).** A physical subunit of a storage controller that provides the ability to attach to one or more interfaces used to communicate with the associated storage devices.

**device provider.** A device-specific handler that receives client application requests that are destined for its device or storage server.

**digital certificate.** A file used to identify the authenticity of a person or organization. A certificate is made up of the following:

- The public key of the person who is being certified
- The name and address of the person who is being certified
- The digital signature of the certification authority
- The issue date
- The expiration date

**digital signature.** A unique mathematically computed signature that ensures accountability.

**disable.** To make nonfunctional.

**disk drive.** A diskette drive or a hard disk drive as opposed to a CD-ROM or optical drive.

**distinguished name.** In secure communications, the name and address of the person and organization to whom a certificate has been issued.

**distributed system.** A system that is spread out across a network.

**DMTF.** See *Desktop Management Task Force*.

**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.

**Domain Name System (DNS).** In the Internet suite of protocols, the distributed database system used to map domain names to IP addresses.

## E

**enable.** To make functional.

**encryption.** In secure communications, a means of scrambling data to prevent the data from being read by anyone other than the intended recipient. The sender uses a key to encrypt the message. The recipient uses the decryption key.

**Enterprise Storage Server.** A disk storage system that provides storage sharing for all major types of servers.

**error message.** An indication that an error has been detected.

**ESS.** See *Enterprise Storage Server*.

**event.**

1. A representation of a change that occurs to a part. The change enables other interested parts to receive notification when something about the part changes. For example, a push button generates an event by signalling that it has been clicked, which may cause another part to display a window.
2. Any significant change in the state of a system resource, network resource, or network application. An event can be generated for a problem, for the resolution of a problem, or for the successful completion of a task. Examples of events are: the normal starting and stopping of a process, the abnormal termination of a process, and the malfunctioning of a server.
3. An occurrence of significance to a task or system, such as the completion or failure of an operation.
4. A data link control command and response passed between adjacent nodes that allows the two nodes to exchange identification and other information necessary for operation over the data link.

**event log.** A file which lists all actions that have occurred.

**extended binary-coded decimal interchange code (EBCDIC).** A coding scheme that was developed by IBM, which you use to represent various alphabetic, numeric, and special symbols with an 8 bit code.

**Extensible Markup Language (XML).** A standard metalanguage for defining markup languages that was derived from and is a subset of SGML. XML omits the more complex and less-used parts of SGML and makes it much easier to (a) write applications to handle document types, (b) author and manage structured information, and (c) transmit and share structured information across diverse computing systems. The use of XML does not require the robust applications and processing that is necessary for SGML. XML is being developed under the auspices of the World Wide Web Consortium (W3C).

**extrinsic method.** A method defined by the schema supported by the CIM Agent.

## F

**failed.** A status reading indicating the inability of a functional unit to perform its required function.

**field.**

1. On a data medium or in storage, a specified area used for a particular class of data.
2. The smallest identifiable part of a record.
3. An identifiable area on a screen.

**file.** A named set of records stored or processed as a unit.

**File Transfer Protocol (FTP).** An application protocol used for transferring files to and from host computers. FTP requires a user ID, and a password to allow access to files on a remote host system.

**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 that meet authorization criteria.

**firmware.**

1. An ordered set of instructions and data stored in a way that is functionally independent of main storage. Firmware is more efficient than software and is more adaptable to change than pure hardware circuitry.
2. Deprecated term for microcode.

**FTP.** See *File Transfer Protocol*.

**FTP site.** An electronic repository of information using File Transfer Protocol (FTP) to transfer data to and from servers.

**function.**

1. A specific purpose of an entity, or its characteristic action.
2. A system component or licensed program that can be optionally installed in a user's system.

## G

**GB.** See *gigabyte*.

**gigabyte (GB).** A gigabyte of storage is 10<sup>9</sup> bytes. A gigabyte of memory is 2<sup>30</sup> bytes.

**graphical user interface (GUI).** A type of computer interface consisting of a visual metaphor of a real world scene, frequently a desktop. The GUI contains icons, representing actual objects, that the user can access and manipulate. Contrast with a command-line interface (CLI).

**GUI.** See *graphical user interface*.

## H

**hard drive.** A storage medium within a storage server used to maintain information that the storage server requires.

**hdisk.** An AIX term for storage space.

**help.**

1. A standard push button or icon that provides information about the item the cursor is on or about the entire dialog box.
2. An action bar choice that has an associated pull-down. Its pull-down contains choices that can be requested to invoke help actions.

**heterogeneous environment.** A network where some or all of the computers have dissimilar architecture but nevertheless are able to communicate.

**homogeneous.** Of the same or similar type. A computer network in which all computers have the same or similar architecture.

**host.** The controlling or highest level in a data communication configuration. In TCP/IP, any system that has at least one Internet address associated with it. A host with multiple network interfaces may have multiple Internet addresses associated with it.

**host application software.** Software application programs executed in the host computer.

**host initiated.** A program executed as a subtask at the request of the host system.

**host name.** In the Internet suite of protocols, the name given to a computer. Sometimes, "host name" is used to mean fully qualified domain name; other times, it is used to mean the most specific subname of a fully qualified domain name. For example, if mycomputer.city.company.com is the fully qualified domain name, either of the following may be considered the host name:

- mycomputer.city.company.com
- mycomputer

**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.**

1. A computer system that is connected to the ESS. The ESS supports both mainframe (S/390 or zSeries) hosts as well as open-systems hosts. System/390 or zSeries hosts are connected to the ESS through ESCON or FICON interfaces. Open-system hosts are connected to the ESS by SCSI or fibre-channel interfaces.
2. The data processing system to which a network is connected and with which the system can communicate.
3. The controlling or highest level system in a data communication configuration.

**HTML.** See *hypertext markup language*.



**HTTP.** See *Hypertext Transfer Protocol*.

**hypertext markup language (HTML).** An interpreted markup language used to create hypertext documents. Hypertext documents can include links to other related documents. HTML controls the format of text and position of form input areas, for example, as well as the navigable links.

**Hypertext Transfer Protocol (HTTP).** The primary protocol in use on the Web.

## I

**IBM product engineering (PE).** IBM third-level service support IBM engineers who have experience in supporting a product, or who are knowledgeable about the product.

**icon.**

1. A graphic symbol, displayed on a screen, that a user can point to with a device such as a mouse in order to select a particular function or software application.
2. A graphical representation of an object, consisting of an image, image background, and a label.

**ID.** See “identifier (ID).”

**identifier (ID).** A unique name or address that identifies things such as programs, devices, or systems.

**initial program load (IPL).**

1. The initialization procedure that causes an operating system to commence operation. Synonymous with system restart, and system startup.
2. The process of loading system programs and preparing a system to run jobs.

**indication.** A unique name or address that identifies things such as programs, devices, or systems.

**initialize.** The formatting of a magnetic tape, except for the system files containing information on structure. All former contents of the tape are deleted.

**initiate.** A network services request sent from a logical unit to a system services control point requesting that a session be established.

**initiator.** A SCSI term for the part of a host computer that communicates with its attached targets.

**insert.** To put a tape cartridge in the I/O station or to automatically have the library move a cartridge from the I/O station to a storage slot or drive.

**install.** Set up for use or service. Adding a product, feature, or function system or device through a simple change or through the addition of multiple components or devices.

**instance.**

1. In Java programming, when you create a specific variable of a particular class type, it is referred to as instantiating or creating an instance of that class
2. In Java programming, when you create a specific variable of a particular class type, it is referred to as instantiating or creating an instance of that class

**interactive.**

1. Pertaining to a program or system that alternately accepts input and then responds. An interactive system is conversational, that is, a continuous dialog exists between user and system.
2. Pertaining to the exchange of information between a user and a computer.

**interchange.** The sending and receiving of data in such a manner that the content of the data is not altered during transmission.

**interface.**

1. A shared boundary between two functional units, defined by functional characteristics, signal characteristics, or other characteristics, as appropriate. The concept includes the specification of the connection of two devices having different functions.
2. Hardware, software, or both, that links systems, programs or devices.

**Internet.** A wide area network that connects thousands of disparate networks in industry, education, government, and research. The Internet network uses TCP/IP as the standard for transmitting information.

**Internet Explorer.** The Web browser provided by Microsoft Corporation.

**Internet Protocol (IP).** A protocol used to route data from its source to its destination in the Internet computing network environment.

**intranet.** A collection of interconnected networks using Internet protocols, but with restricted access and not available to the public.

**intrinsic method.** A method that is supported by the CIM Agent itself.

**IP.** See *Internet Protocol*.

**IP address.** A group of four decimal numbers that provides a unique address for the computer.

## J

**JAR.** See *Java ARchive file*.

**Java ARchive (JAR) file.** A collection of Java classes and other files packaged into a single file. By using a Java ARchive file, the browser makes only one connection to the server rather than several. By

reducing the number of files that the browser needs to load from the server, you can download and run your applet that much faster. Java ARchive files can also be compressed, making the overall file size smaller and therefore faster to download.

**Java.** A programming language that enables application developers to create object-oriented programs that are very secure and portable across different machine and operating system platforms. Java is also dynamic enough to allow for easy expansion.

**Java applet.** Java code that is compiled into a compact and optimized program.

**Java runtime environment (JRE).** The underlying, invisible system on your computer that runs applets the browser passes to it.

**JRE.** See *Java runtime environment*.

## K

**KB.** See *kilobyte*.

**key ring.** In secure communications, a file that contains public keys, private keys, trusted roots, and certificates.

**kilobyte (KB).** A kilobyte of storage is 103 bytes. A kilobyte of memory is 210 bytes.

## L

**LAN.** See *local area network*.

**link.** The connection between two systems or files.

**list box.** A control that contains scrollable choices from which a user can select one.

**local area network (LAN).** A computer network located on a user's premises within a limited geographical area.

## M

**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.

**managed object format (MOF).** A method of compilation and creation of data storage. The MOF compiler stores information in the data repository.

**MB.** See *megabyte*.

**megabyte (MB).** A megabyte of storage is 1,000,000 bytes. A megabyte of memory is 1,048,576 bytes.

**Micro Channel architecture.** 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.

**method.** An implementation of a function on a class.

**middleware.** The term middleware is used to describe separate products that serve as the glue between two applications. It is, therefore, distinct from import and export features that may be built into one of the applications. Middleware connects two sides of an application and passes data between them.

**mid-range systems.** A set of multi-use servers with hard disk capacity of 50 GB to 250 GB.

**MOF.** See *managed object format*.

**mount.**

1. To place a data medium in a position to operate.
2. To make recording media accessible.
3. In AIX, to make a file system accessible.

## N

**namespace.** A namespace defines the scope over which a CIM schema applies. The only namespace supported by the CIM Agent is root/cimv2. A CIM schema or version is loaded into a namespace when that schema is compiled by the Managed Object Format (MOF) compiler. CIM operations always execute within the context of a namespace. The namespace must be specified within the message that the client sends to the CIM Agent.

**Netscape Navigator.** The Web browser provided by Netscape Communications Corporation.

**network.**

1. A configuration of data processing devices and software connected for information interchange.
2. A group of nodes and the links interconnecting them.

**network server.** The server that controls network operations and management, provides access to files and programs for all the workstations in a particular network.

**next.** A button or link that allows the user to move forward to the screen which follows the one they are currently viewing.

**nonvolatile storage.** Memory that stores active write data to avoid data loss in the event of a power loss.

**not installed.** A status reading which indicates the device is not present or cannot be initiated at this location.

**NVS.** See *nonvolatile storage*.

## O

**object.** An object contains both data and code. The principle feature of an object is that the data is kept privately inside the object structure. Any calculations on that data are also private so it does not matter how that data is stored or how the computations are carried out. It only matters that the object's data and routines are internally consistent and any access to the data in an object always provides consistent results.

**object name.** An object name consists of a namespace path and a model path. The namespace path provides access to the CIM implementation managed by the CIM Agent. The model path provides navigation within the implementation.

**offline.** The operating condition when the 3584 library cannot interact with host systems.

**online.** The operating condition when host applications can interact with the 3584 library.

**open system.** A system whose characteristics comply with standards made available throughout the industry, and therefore can be connected to other systems that comply with the same standards.

### open system hosts.

1. A computer system that is accessed by a user working at a remote location. The term is typically used when two computer systems are connected over a LAN or through a modem.
2. A computer connected to a TCP/IP network, including the Internet. Each host has a unique IP address.

**operating system.** The master computer control program that translates user commands and allows software applications to interact with the hardware.

**operation request message.** An XML-encoded message that is sent to the CIMON by a client application.

**operation response message.** An XML-encoded message that is sent to a client application by the CIMON.

**operator.** A person or program responsible for managing functions controlled by a given piece of software. The person who operates a device or keeps a system running.

**operator intervention.** A state requiring the operator of the system or device to take action, either by acknowledging messages and initiating functions or performing problem resolution.

**organizationally unique identifier (OUI).** An identifier that identifies an organization according to IEEE standards.

**OUI.** See *organizationally unique identifier*.

## P

**panel.** The formatted display of information that appears on a display screen.

**parallel access volume (PAV).** Created by associating multiple devices of a single control-unit image with a single logical device. Up to 8 device addresses can be assigned to a parallel access volume.

**password.** A unique string of characters known to a computer system and to a user, who must specify the character string to gain access to a system and to the information stored within it.

**path.** A statement that indicates where a file is stored on a particular drive. The path consists of all the directories that must be opened to get to a particular file. The directory names are separated by the slash (/).

**platform.** An ambiguous term that may refer to the hardware, operating system, or a combination of the hardware and the operating system on which software programs run.

**platform-independent.** Code which is platform-independent can run on multiple combinations of operating systems and hardware.

**program.** A generic term for the software that controls the operation of a host computer. Typically, the program is an operating system that allows sharing of the host resources between multiple tasks.

**property.** A value used to characterize instances of a class.

**protocol.** The set of rules that govern the operation of functional units of a communication system. This allows communication to take place. Protocols can determine low-level details of machine-to-machine interfaces, such as the order in which bits from a byte are sent. They can also determine high-level exchanges between application programs, such as file transfer.

**provider.** See *device provider*.

**proxy server.** A server that can retrieve documents from other servers for its clients.

**public access.** Accessible by anyone who has access. If you schedule a task to run and specify public access, all authorized users can view the results. If you do not specify public access, only you have access to the results.



## Q

**qualifier.** Characterizes other elements. A qualifier provides additional information about classes, associations, indications, methods, method parameters, instances, properties, or references.

## R

**RAM.** See *random access memory*.

**random access memory.** A temporary storage location in which the central processing unit (CPU) stores and executes its processes.

**reference.** Defines the role that an object plays in an association.

**register.** To record or enroll.

**required.** A status reading which indicates the current setting is mandatory and cannot be changed.

## S

**SAN.** See *storage area network*.

**schema.** A group of classes defined to a single namespace. Within the CIM Agent, the schemas that are supported are the ones loaded through the Managed Object Format (MOF) compiler.

**screen.** The physical surface of a display device upon which information is shown to a user.

**Secure Sockets Layer (SSL).** A protocol that provides secure communications on the Internet.

**select.**

1. In Client Access for Windows, to highlight a choice so that a subsequent action will use that choice. Selecting does not initiate the action.
2. To choose a button on the display screen.
3. To place the cursor on an object (name or command) and press the Select (left) button on the mouse or the Select key on the keyboard.

**server.**

1. In a federated database system, a unit of information that identifies a data source to a federated server.
2. A functional unit that provides services to one or more clients over a network.
3. A computer that provides shared services to other computers over a network; for example, a file server, a print server, or a mail server.

4. A machine that provides resources to the network. It provides a network service, such as disk storage and file transfer, or a program that uses such a service.

**service location protocol (SLP).** A directory service that a client application calls to locate the CIM Object Manager.

**shared storage.** Storage within a storage facility that is configured such that multiple homogenous or divergent 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. You need to design the programs to handle the effects of concurrent access.

**sign on.** A procedure to be followed at a terminal or workstation to establish a link to a computer. (2) To begin a session at a workstation.

**silent mode.** A program that installs automatically due to specific installation dependent custom information entered by the user during an umbrella installation.

**simple network management protocol (SNMP).**

1. An SNMP Manager is part of a network administration software product, such as Tivoli TME 10 Netview.
2. SNMP permits you to define management information base (MIB) extensions, or enterprise-specific MIBs. By loading a MIB file on a manager station, you can monitor the MIB objects. The SNMP Agent accesses MIB objects when a request is received from an SNMP Manager.
3. SNMP is a protocol designed to give a user the capability to remotely manage a computer network by polling and setting terminal values and monitoring network events.

**simple operation request.** Operation request messages that contain the <SIMPLEREQ> XML tag.

**simple operation responses.** Operation response messages that contain the <SIMPLERSP> tag.

**SLP.** See *service location protocol*.

**SMIT.** See “system management interface tool (SMIT)” on page 254.

**software.** All or part of the programs, procedures, rules, and associated documentation of a computer processing system. Software is an intellectual creation that is independent of the medium on which it is recorded.

**status.** The condition or state of hardware or software, usually represented by a status code.

**storage.** A functional unit into which data or data media can be placed, in which it can be retained and from which it can be retrieved.

**storage administrator.** A person in the data processing center who is responsible for defining, carrying out, and maintaining storage management policies.

**storage area network (SAN).** A high speed subnetwork of shared storage devices. A SAN's architecture makes all storage devices available to all servers on a LAN or WAN. As more storage devices are added, they too will be accessible from any server in the larger network. Since stored data does not reside directly on a network's servers, server power is used for applications, and network capacity is released to the end user.

**storage device.** A physical unit which provides a mechanism to store data on a given medium such that it can be subsequently retrieved.

**storage management.** The task of using storage, such as DASD, tape, or optical devices, to keep and deliver data to applications.

**storage management application.** A software tool used to manage storage resources.

**storage resources.** Data that needs to be managed.

**storage subsystem.** A storage control and its attached storage devices.

**storage server.** A unit that manages attached storage devices and provides access to the storage or storage related functions for one or more attached hosts.

**submenu.** A menu related to and reached through a main menu.

**subsystem identification (SSID).** A number that uniquely identifies a logical subsystem within a computer installation.

**system management interface tool (SMIT).** An interface tool of the AIX operating system for installing, maintaining, configuring, and diagnosing tasks.

## T

**TB.** See *terabyte*.

**TCP/IP.** See *Transmission Control Protocol/Internet Protocol*.

**terabyte (TB).** A unit of measure equal to 10<sup>12</sup> bytes.

**terminate, termination.**

1. To end a process.
2. The process of ending a process, usually without making any changes.

**Transmission Control Protocol/Internet Protocol (TCP/IP).** A set of communication protocols that support peer-to-peer connectivity functions for both local and wide area networks.

**tutorial.** Teaches a user how to use the product. Tutorials generally allow the user to move through the functions at their own pace than reference manuals and usually contain less detail.

## U

**UA.** See *user assistance*.

**user assistance (UA).** This refers to the help files, where users go to find information to assist them in operations or problem resolution.

**user ID.** The unique string of characters that identifies any person or device (the User) that may issue or receive commands and messages to or from the information processing system.

## V

**value.**

1. A specific occurrence of an attribute.
2. A quantity assigned to a constant, a variable, parameter or a symbol.

**verification.** Authentication, certification, or proof. For example, verification of sensitive data is frequently enforced by dual entry of all the data and a comparison of the results.

## W

**WAN.** See *wide area network*.

**WBEM.** See *Web-based enterprise management*.

**Web.** The World Wide Web. The network of HTTP servers that contain programs and files, such as hypertext documents that contain links to other documents on HTTP servers.

**Web-based enterprise management (WBEM).** Web-based operations managed over HTTP.

**wide area network (WAN).** A network that provides communication services to a geographic area larger than served by a local area network or a metropolitan area network, and that may use or provide public communication facilities.

**World Wide Web (WWW).** A global network of servers containing programs and files, accessible by the public.

**WWW.** See *World Wide Web*.

## X, Y, Z

**XML.** See *Extensible Markup Language*.

## Special Characters

**\* (an asterisk).** This character is used to indicate all valid values in a field. For example, an IP address of 204.146.18.\* specifies all valid addresses attached to 204.146.18.



---

# Index

## A

- about this guide
  - notational conventions 86
- address subcommand 98, 100
- adduser subcommand 91
- AIX
  - CLI installation 7
  - configuring CIM Agent 22
  - configuring for unsecure mode 25
  - installation
    - graphical mode 10
    - unattended mode 19
  - installation overview 7
  - installing the CIM Agent in graphical mode 10
  - installing the CIM Agent in unattended mode 19
  - mounting the CD 9
  - removing the CIM Agent 27
  - running the CIM Agent 26
  - verifying installation 21
- AllocatedFromStoragePool class 168
- anatomy of a command line 88
- association, ESS API 121
- AssociatorNames method parameters 129
- Associators method parameters 129
- AuthorizedSubject class 170
- AuthorizedTarget class 170

## C

- Chassis class 176
- chess subcommand 102
- chessserver subcommand 104
- chuser subcommand 92
- CIM Agent
  - class information 139
  - command descriptions 85
  - communication concepts 123
  - communication methods 124
  - component
    - Access point subprofile instance diagram 216
    - Array profile instance diagram 215
    - Copy services subprofile instance diagram 218
    - Disk drive subprofile instance diagram 222
    - Extra capacity set subprofile instance diagram 217
    - Location subprofile instance diagram 217
    - LUN creation subprofile instance diagram 219
    - LUN mapping and mapping subprofile instance diagram 220
    - Performance extension 221
    - Physical package instance diagram 214
    - Pool manipulation, capacity, and settings subprofile instance diagram 218
  - components 3
  - configuration on AIX 22
  - configuration on Linux 48
  - configuration on Windows 72

### CIM Agent (*continued*)

- configuration programs 89
- configuring for unsecure mode on AIX 25
- configuring for unsecure mode on Linux 50
- configuring for unsecure mode on Windows 75
- functional groups 134
- installation overview for AIX 7
- installation overview for Linux 33
- installation overview for Windows 59
- installation requirements 4
- installing CLI on AIX 7
- installing CLI on Linux 33
- installing CLI on Windows 60
- installing on AIX in graphical mode 10
- installing on AIX in unattended mode 19
- installing on Linux in graphical mode 35
- installing on Linux in unattended mode 43
- installing on Windows in graphical mode 61
- installing on Windows in silent mode 69
- installing on Windows in unattended mode 69
- intrinsic and extrinsic communication methods 123
- invoking 86
- mounting the CD on AIX 9
- overview 1, 6
- product overview 1
- quick reference for class definitions 139
- removing from AIX 27
- removing from Linux 52
- removing from Windows 80
- running on AIX 26
- running on Linux 51
- security 6
- verifying connection to the ESS 76
- verifying installation on AIX 21
- verifying installation on Linux 47
- verifying installation on Windows 71

### CIM API communication methods

- AssociatorNames 129
- Associators 129
- CreateInstance 125
- DeleteInstance 125
- EnumerateClasses 126
- EnumerateClassNames 127
- EnumerateInstanceNames 128
- EnumerateInstances 127
- EnumerateQualifiers 133
- error codes 135
- ExecQuery 128
- GetClass 124
- GetInstance 124
- GetProperty 131
- GetQualifier 132
- ModifyInstance 126
- ReferenceNames 131
- References 130
- SetProperty 132
- SetQualifier 132

- CIM component definitions
  - core classes 121
  - namespace 121
  - object name 121
- CIM overview 3
- CIMOM operations
  - client communication 123
  - intrinsic and extrinsic methods 123
- class definitions
  - AuthorizedSubject properties 170
  - AuthorizedTarget properties 170
  - ConcreteDependencyController properties 194
  - ConcreteDependencyPrivilege properties 171
  - ConcreteDependencyStorageHardwareID properties 171
  - ControllerConfigurationService properties 185
  - DeviceMaskingCapabilities properties 191
  - ElementCapabilitesMasking properties 194
  - ElementConformsToProfile properties 197
  - ElementSettingData properties 172
  - HostedService4 properties 191
  - IBMTSESS\_AllocatedFromStoragePool properties 168
  - IBMTSESS\_Chassis properties 176
  - IBMTSESS\_Component properties 201
  - IBMTSESS\_ComputerSystemPackage properties 177
  - IBMTSESS\_ComputerSystemPackageCard properties 181
  - IBMTSESS\_ConcretelIdentityCapSet properties 178
  - IBMTSESS\_DiskDrive properties 181
  - IBMTSESS\_ElementCapabilities properties 173
  - IBMTSESS\_EltCapabilitiesStgPool properties 203
  - IBMTSESS\_ExtraCapacitySet properties 177
  - IBMTSESS\_FCPort properties 151
  - IBMTSESS\_HostedAccessPoint properties 180
  - IBMTSESS\_HostedPrimordialStoragePool properties 203
  - IBMTSESS\_HostedService properties 171
  - IBMTSESS\_HostedService6 properties 211
  - IBMTSESS\_HostedStoragePool properties 173
  - IBMTSESS\_InitiatorElementSettingData properties 198
  - IBMTSESS\_Location properties 197
  - IBMTSESS\_MediaPresent properties 184
  - IBMTSESS\_MediaPresentExtent properties 172
  - IBMTSESS\_MemberOfCollection properties 181
  - IBMTSESS\_PerformanceStatisticsService properties 209
  - IBMTSESS\_PhysicalElementLocation properties 197
  - IBMTSESS\_PhysicalPackage properties 183
  - IBMTSESS\_PrimordialStoragePool properties 201
  - IBMTSESS\_Product properties 167
  - IBMTSESS\_ProductPhysicalComponent properties 179
  - IBMTSESS\_Provider properties 204
  - IBMTSESS\_Realizes properties 184
  - IBMTSESS\_RemoteServiceAccessPoint properties 179
- class definitions (*continued*)
  - IBMTSESS\_RemoteSourceStorageSynchronized properties 211
  - IBMTSESS\_RemoteTargetStorageSynchronized properties 212
  - IBMTSESS\_RemoteVolume properties 211
  - IBMTSESS\_StorageCapabilities properties 173
  - IBMTSESS\_StorageClientSettingData properties 198
  - IBMTSESS\_StorageConfigurationService properties 155
  - IBMTSESS\_StorageExtent properties 199
  - IBMTSESS\_StorageProcessorCard properties 180
  - IBMTSESS\_StorageSetting properties 175
  - IBMTSESS\_StorageSynchronized properties 203
  - IBMTSESS\_StorageSystem properties 145
  - IBMTSESS\_StorageSystemToController properties 169
  - IBMTSESS\_StorageSystemToPort properties 168
  - IBMTSESS\_StorageSystemToVolume properties 168
  - IBMTSESS\_SystemDevice properties 185
  - IBMTSESS\_Volume properties 147
  - IBMTSESS\_VolumeSpace properties 146
  - IBMTSESS\_VolumeSpaceStatisticalData properties 209
  - IBMTSESS\_VolumeSpaceStatistics properties 207
  - IBMTSESS\_VolumeStatisticalData properties 208
  - IBMTSESS\_VolumeStatistics properties 204
  - LunMaskPrivilegeService properties 163
  - Privilege properties 153
  - ProtocolControllerForPort properties 169
  - ProtocolControllerForUnit properties 169
  - RegisteredProfile properties 195
  - SCSIProtocolController properties 152
  - StorageHardwareID properties 154
  - StorageHardwareIDManagementService properties 166
  - SubProfileExtendsProfile properties 196
- class information, CIM Agent 139
- class, ESS API 121
- command line string 88
- commands
  - description 85
  - example of a typical command line string 88
  - interactive mode 86
  - mkcertificate 116
  - operational 88, 112
  - setdevice 97
  - setentry 95
  - setoutput 96
  - setuser 90
  - shell mode 86
  - slpd 117
  - startcimom 113
  - stopcimom 114
  - utility 115
  - verifyconfig 118
- comments, how to send viii
- Component class 201
- ComputerSystemPackage class 177

- ComputerSystemPackageCard class 181
- ConcreteDependencyController class 194
- ConcreteDependencyPrivilege class 171
- ConcreteDependencyStorageHardwareID class 171
- ConcreteIdentityCapSet class 178
- configuration
  - AIX 22
  - Linux 48
  - unsecure mode on AIX 25
  - unsecure mode on Linux 50
  - unsecure mode on Windows 75
  - Windows 72
- ControllerConfigurationService class 185
- core classes, CIM 121
- CreateInstance method parameters 125, 126

## D

- DeleteInstance method parameters 125
- DeleteQualifier, CIM API communication methods 133
- DeviceMaskingCapabilities class 191
- DiskDrive class 181

## E

- ElementCapabilitesMasking class 194
- ElementCapabilities class 173
- ElementConformsToProfile class 197
- elements, ESS API 121
- ElementSettingData class 172
- EltCapabilitiesStgPool class 203
- emphasis 88
- EnumerateClasses method parameters 126
- EnumerateClassNames method parameters 127
- EnumerateInstanceNames method parameters 128
- EnumerateInstances method parameters 127
- EnumerateQualifiers, CIM API communication methods 133
- error codes returned by the CIMOM 135
- error codes returned by the ESS VSS Provider 238
- ESS API
  - overview 1
- ESS API component definitions
  - elements 121
- ESS class definitions
  - individual functional schemas 214
  - quick reference 139
- ESS VSS Provider
  - error codes 238
  - installation requirements 224
- ExecQuery method parameters 128
- ExtraCapacitySet class 177

## F

- FCPort class 151
- functional groups 134

## G

- GetClass method parameters 124
- GetInstance method parameters 124
- GetProperty method parameters 131
- GetQualifier method parameters 132
- guidelines for invoking the CIM Agent 86

## H

- HostedAccessPoint class 180
- HostedPrimordialStoragePool class 203
- HostedService class 171
- HostedService4 class 191
- HostedService6 class 211
- HostedStoragePool class 173

## I

- IBMTSESS\_ class definitions
  - AllocatedFromStoragePool 168
  - AuthorizedSubject 170
  - AuthorizedTarget 170
  - Chassis 176
  - Component 201
  - ComputerSystemPackage 177
  - ComputerSystemPackageCard 181
  - ConcreteDependencyController 194
  - ConcreteDependencyPrivilege 171
  - ConcreteDependencyStorageHardwareID 171
  - ConcreteIdentityCapSet 178
  - ControllerConfigurationService 185
  - DeviceMaskingCapabilities 191
  - DiskDrive 181
  - ElementCapabilitesMasking 194
  - ElementCapabilities 173
  - ElementConformsToProfile 197
  - ElementSettingData 172
  - EltCapabilitiesStgPool 203
  - ExtraCapacitySet 177
  - FCPort 151
  - HostedAccessPoint 180
  - HostedPrimordialStoragePool 203
  - HostedService 171
  - HostedService2 172
  - HostedService3 172
  - HostedService4 191
  - HostedService6 211
  - HostedStoragePool 173
  - InitiatorElementSettingData 198
  - Location 197
  - LunMaskPrivilegeService 163
  - MediaPresent 184
  - MediaPresentExtent 172
  - MemberOfCollection 181
  - PerformanceStatisticsService 209
  - PhysicalElementLocation 197
  - PhysicalPackage 183
  - PrimordialStoragePool 201
  - Privilege 153
  - Product 167



## IBMTSESS\_ class definitions *(continued)*

- ProductPhysicalComponent 179
- ProtocolControllerForPort 169
- ProtocolControllerForUnit 169
- Provider 204
- Realizes 184
- RegisteredProfile 195
- RemoteServiceAccessPoint 179
- RemoteSourceStorageSynchronized 211
- RemoteTargetStorageSynchronized 212
- RemoteVolume 211
- SCSIProtocolController 152
- StorageCapabilities 173
- StorageClientSettingData 198
- StorageConfigurationService 155
- StorageExtent 199
- StorageHardwareID 154
- StorageHardwareIDManagementService 166
- StorageProcessorCard 180
- StorageSetting 175
- StorageSynchronized 203
- StorageSystem 145
- StorageSystemToController 169
- StorageSystemToPort 168
- StorageSystemToVolume 168
- SubProfileExtendsProfile 196
- SystemDevice 185
- Volume 147
- VolumeSpace 146
- VolumeSpaceStatisticalData 209
- VolumeSpaceStatistics 207
- VolumeStatisticalData 208
- VolumeStatistics 204
- indication, ESS API 121
- InitiatorElementSettingData class 198
- installation
  - AIX
    - graphical mode 10
    - unattended mode 19
  - CLI on AIX 7
  - CLI on Linux 33
  - CLI on Windows 60
  - graphical mode on AIX 10
  - graphical mode on Linux 35
  - graphical mode on Windows 61
  - Linux
    - graphical mode 36
  - mounting the CD on AIX 9
  - overview for AIX 7
  - overview for Linux 33
  - overview for Windows 59
  - silent mode on Windows 69
  - unattended mode on AIX 19
  - unattended mode on Linux 43
  - unattended mode on Windows 69
  - verifying on AIX 21
  - verifying on Linux 47
  - verifying on Windows 71
  - VSS Provider
    - prerequisites 224

## installation *(continued)*

- Windows
  - prerequisites 5
- invoking the CIM Agent 86

## L

### Linux

- CLI installation 33
- configuring CIM Agent 48
- configuring for unsecure mode 50
- installation
  - graphical mode 36
- installation overview 33
- installing the CIM Agent in graphical mode 35
- installing the CIM Agent in unattended mode 43
- removing the CIM Agent 52
- running the CIM Agent 51
- verifying installation 47
- Location class 197
- Isess subcommand 106
- Isessserver subcommand 107
- Isuser subcommand 93
- LunMaskPrivilegeService class 163

## M

- MediaPresent class 184
- MediaPresentExtent class 172
- MemberOfCollection class 181
- method, ESS API 121
- mkcertificate command 116
- modifyconfig subcommand 119
- mounting the CD on AIX 9

## N

- namespace, CIM 121
- notational conventions
  - emphasis 88
  - special characters 87

## O

- object name, CIM 121
- operational commands 88, 112

## P

- PerformanceStatisticsService class 209
- PhysicalElementLocation class 197
- PhysicalPackage class 183
- prerequisites
  - VSS Provider 224
  - Windows 5
- PrimordialStoragePool class 201
- Privilege class 153
- Product class 167
- ProductPhysicalComponent class 179
- property, ESS API 121



ProtocolControllerForPort class 169  
ProtocolControllerForUnit class 169  
Provider class 204

## Q

qualifier, ESS API 121  
quick reference table, class definitions 139

## R

Realizes class 184  
reference, ESS API 121  
ReferenceNames method parameters 131  
RegisteredProfile class 195  
RemoteServiceAccessPoint class 179  
RemoteSourceStorageSynchronized class 211  
RemoteTargetStorageSynchronized class 212  
RemoteVolume class 211  
removing the CIM Agent  
    AIX 27  
    Linux 52  
removing the ESS CIM Agent  
    Windows 80  
rmess subcommand 108  
rmessserver subcommand 109  
rmuser subcommand 94  
running the CIM Agent  
    on AIX 26  
    on Linux 51

## S

schema, ESS API 121  
SCSIProtocolController class 152  
setdevice command 97  
setentry command 95  
setentry subcommand 110  
setoutput command 96  
setoutput subcommand 111  
SetProperty method parameters 132  
SetQualifier method parameters 132  
setuser command 90  
setuser subcommand 90  
silent installation on Windows 69  
slpd command 117  
special characters 87  
startcimom command 113  
stopcimom command 114  
StorageCapabilities class 173  
StorageClientSettingData class 198  
StorageConfigurationService class 155  
StorageExtent class 199  
StorageHardwareID class 154  
StorageHardwareIDManagementService class 166  
StorageProcessorCard class 180  
StorageSetting class 175  
StorageSynchronized class 203  
StorageSystem class 145  
StorageSystemToController class 169  
StorageSystemToPort class 168

StorageSystemToVolume class 168  
subcommands  
    address 98, 100  
    adduser 91  
    chess 102  
    chessserver 104  
    chuser 92  
    lssess 106  
    lssessserver 107  
    lsuser 93  
    modifyconfig 119  
    rmess 108  
    rmessserver 109  
    rmuser 94  
    setentry 110  
    setoutput 111  
    setuser 90  
SubProfileExtendsProfile class 196  
SystemDevice class 185

## U

unattended installation on Windows 69  
utility commands 115

## V

verifyconfig command 118  
verifying connection to the ESS  
    on Windows 76  
verifying installation  
    AIX 21  
    Linux 47  
    Windows 71  
Volume class 147  
VolumeSpace class 146  
VolumeSpaceStatisticalData 209  
VolumeSpaceStatistics class 207  
VolumeStatisticalData class 208  
VolumeStatistics class 204  
VSS Provider  
    prerequisites 224

## W

Windows  
    CLI installation 60  
    configuring ESS CIM Agent 72  
    configuring for unsecure mode 75  
    installation overview 59  
    installing the ESS CIM Agent in graphical mode 61  
    installing the ESS CIM Agent in silent mode 69  
    installing the ESS CIM Agent in unattended mode 69  
    prerequisites 5  
    removing the ESS CIM Agent 80  
    verifying connection to the ESS 76  
    verifying installation 71



---

# Readers' Comments — We'd Like to Hear from You

IBM TotalStorage Enterprise Storage Server  
Application Programming Interface Reference

Publication No. GC35-0489-00

Overall, how satisfied are you with the information in this book?

|                      | Very Satisfied           | Satisfied                | Neutral                  | Dissatisfied             | Very Dissatisfied        |
|----------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Overall satisfaction | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

How satisfied are you that the information in this book is:

|                          | Very Satisfied           | Satisfied                | Neutral                  | Dissatisfied             | Very Dissatisfied        |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Accurate                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Complete                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Easy to find             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Easy to understand       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Well organized           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Applicable to your tasks | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Please tell us how we can improve this book:

Thank you for your responses. May we contact you? ☐ Yes ☐ No

When you send comments to IBM, you grant IBM a nonexclusive right to use or distribute your comments in any way it believes appropriate without incurring any obligation to you.

---

Name

---

Address

---

Company or Organization

---

Phone No.

Cut or Fold  
Along Line

### Fold and Tape

**Please do not staple**

### Fold and Tape



NO POSTAGE  
NECESSARY  
IF MAILED IN THE  
UNITED STATES

**BUSINESS REPLY MAIL**

FIRST-CLASS MAIL PERMIT NO. 40 ARMONK, NEW YORK

POSTAGE WILL BE PAID BY ADDRESSEE

International Business Machines Corporation  
RCF Processing Department  
M86/050-3  
5600 Cottle Road  
San Jose, CA 95193-0001



Fold and Tape

**Please do not staple**

Fold and Tape

GC35-0489-00

Cut or Fold  
Along Line





Printed in USA

GC35-0489-00



Spine information:



IBM TotalStorage Enterprise  
Storage Server

ESS API Reference