



iStor Networks, Inc.

## Virtual Disk Services Guide

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## Document Revision Level

Revision	Date	Description
1.0	October 2007	Initial release
1.1	July 2008	Updated the product names and screen captures; also updated some target node information for Version 2.0.0 of the product software.
1.2	December 2009	Updated the copyright year and the list of iStor patent numbers, and minor formatting improvements.

# Preface

This guide is intended for storage managers and administrators who will be using Microsoft Virtual Disk Services (VDS) to manage iStor storage systems.

This guide assumes that the user:

- Is computer literate.
- Is familiar with operating Web browser software and working in a windowing environment.
- Has a basic understanding of storage products and concepts.

## Typographic Conventions

The following conventions and icons are used in this guide.

### Notes

Notes provide information that deserves special attention. Notes are preceded by the following icon:



### Cautions

Cautions contain information which, if not followed, can cause damage to the system. Cautions are preceded by the following icon:



### Warnings

Warnings contain information which, if not followed, can cause damage to the system and to the person installing it. Warnings are preceded by the following icon:



## Contact Information

For more information about iStor storage products or iStor Networks, Inc., please contact us using any of the following methods:

- **Voice calls:** We welcome your calls Monday through Friday, from 8:00 am to 5:00 pm Pacific Time at (949) 753-8999. Voice mail is available during non-business hours.
- **Email:** If you prefer, you can send information requests to our e-mail address: [info@istor.com](mailto:info@istor.com).
- **Fax calls:** You can also send your requests for information to our 24-hour fax number: (949) 753-1068.
- **Web site:** Our Web site contains valuable information about our products. We encourage you to visit us at <http://www.istor.com>.
- **Technical support:** The customer-satisfaction arm of iStor Networks is available by calling (800) 689-1409 and going to support or through email at [support@istor.com](mailto:support@istor.com).

# Contents

<b>Chapter 1</b>	<b>Introduction .....</b>	<b>1</b>
	1.1 System Requirements.....	1
<b>Chapter 2</b>	<b>Installation .....</b>	<b>2</b>
<b>Chapter 3</b>	<b>Using the VDS Hardware Provider .....</b>	<b>8</b>
	3.1 Starting the VDS Hardware Provider Control Panel Applet .....	8
	3.1.1 Adding a New Connection .....	8
	3.1.2 Removing an Existing Connection .....	10
	3.1.3 Modifying an Existing Connection .....	10
	3.2 VDS Support .....	12
	3.3 VDS Supported Features.....	13
	3.4 VDS Unsupported Features.....	16
	3.5 VDS Notifications .....	16
<b>Appendix A - Glossary.....</b>		<b>17</b>

## List of Figures

Figure 2-1. Default Web Page .....	2
Figure 2-2. Initial Screens for Running the Installer .....	3
Figure 2-3. Welcome Screen .....	3
Figure 2-4. License Agreement Screen .....	4
Figure 2-5. Destination Folder .....	4
Figure 2-6. Installation Options .....	5
Figure 2-7. Custom Installation Options .....	5
Figure 2-8. Ready to Install the Program Screen .....	6
Figure 2-9. InstallShield Wizard Completed Screen .....	6
Figure 2-10. iStor VDS Hardware Provider in the Windows Control Panel .....	7
Figure 3-1. VDS Hardware Provider Dialog Box .....	8
Figure 3-2. Edit Connection Dialog Box .....	9
Figure 3-3. Adding a Connection to the List .....	9
Figure 3-4. Example of Removing an Existing Connection .....	10
Figure 3-5. Screen for Modifying an Existing Connection .....	10
Figure 3-6. Dialog Box for Modifying an Existing Connection .....	11

## List of Tables

Table 3-1. Connection Status.....	11
Table 3-2. VDS Hints .....	14

# Chapter 1 Introduction

The iStor Advanced Features for Windows contains software specifically designed for the Microsoft Windows operating system that is used to manage iStor storage systems. The iStor Advanced Features for Windows consists of the following items:

- VDS Hardware Provider and a Control Panel Applet
- Windows Client Software for the Command Line Interface

This document describes the iStor VDS Hardware Provider and the Control Panel Applet for using Microsoft's Virtual Disk Services with an iStor storage system. For information about the Command Line Interface, refer to the *Command Line Interface User's Guide* (document number ISCLISWUG).

## 1.1 System Requirements

The following components are required for successful installation of the iStor VDS Hardware Provider.

- Windows Server 2003R2, Service Pack 2, or higher
- iStor version 2.0.0 (or later) software on an iStor storage system
- Windows Storage Manager for SAN (includes VDS v1.1 Update for R2 and .NET v2.0)
- Internet access
- Initial configuration of the iStor storage system
- Internet Explorer v6.0 or higher

## Chapter 2 Installation

The installation process allows you to install the iStor VDS Hardware Provider into the host server's operating system. The installation program for the Advanced Features for Windows is included in the software of the iStor storage system.

1. From a Microsoft Windows Server 2003 R2 computer, launch your Web browser and point it to the IP address of the storage system's management port. The default web page contains a link to launch the **Advanced Features for Windows** installer (see Figure 2-1).
2. Click the link at the bottom of the default web page to launch the **Advanced Features for Windows** installer.



Figure 2-1. Default Web Page



The link only appears in browsers running on a Microsoft Windows operating system.

3. Step through the installer, selecting all the defaults.
  - a. Run the installer (see Figure 2-2). You can either run the installer directly from the iStor storage system, or you can save the installer to your local system, and run it at a later time.

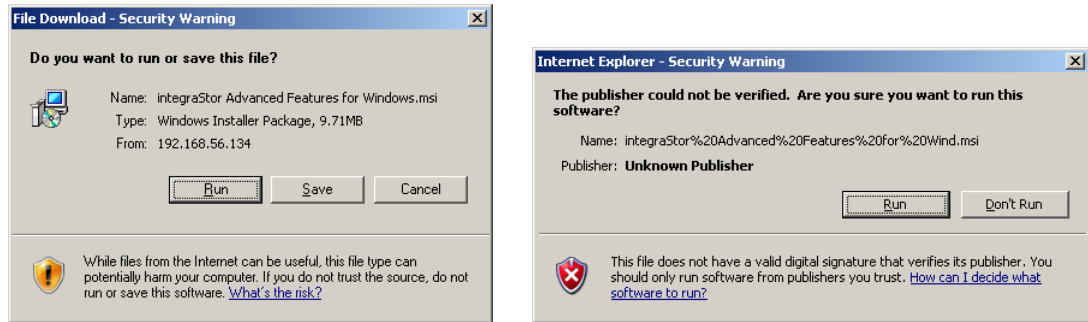


Figure 2-2. Initial Screens for Running the Installer

- b. Start the InstallShield Wizard. When the Welcome screen appears (see Figure 2-3), click Next.



Figure 2-3. Welcome Screen

- c. In the License Agreement screen (see Figure 2-4), review the License Agreement and select I accept the terms in the license agreement. Click Next.

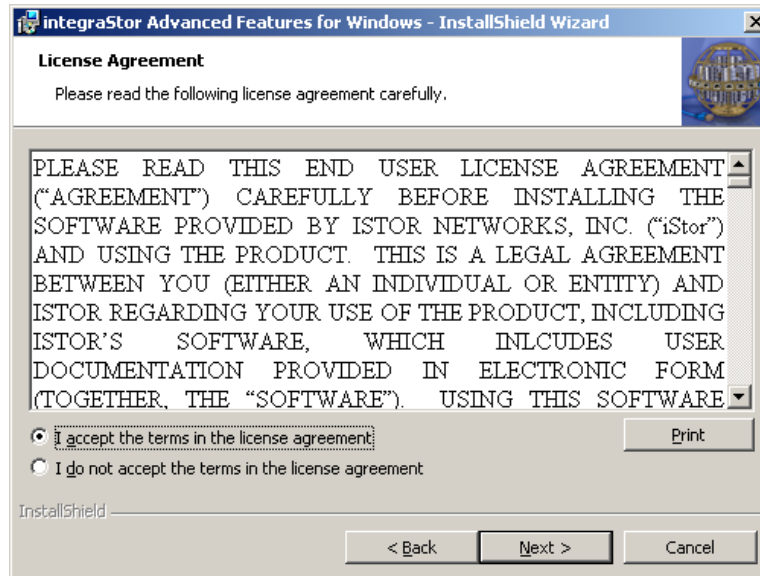


Figure 2-4. License Agreement Screen

- d. When the Destination Folder screen appears (see Figure 2-5), accept the default destination folder and click **Next**.

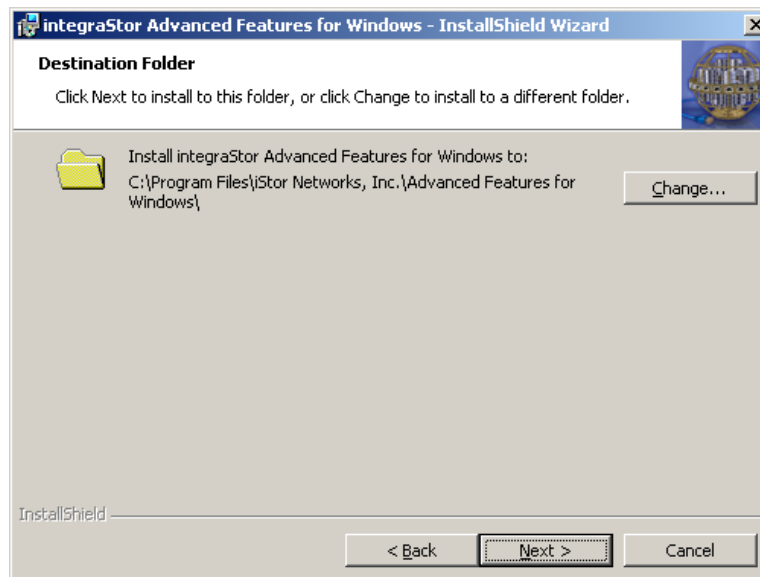


Figure 2-5. Destination Folder

- e. Select either the **Complete** or **Custom** installation option (see Figure 2-6). If you select the Complete (default) option, both the VDS Hardware Provider and the CLI for Windows will be installed. However, if you only want to install the VDS Hardware Provider, select the **Custom** option to display the screen shown in Figure 2-7 and disable the installation of the CLI for Windows. After making your selection, click **Next**.

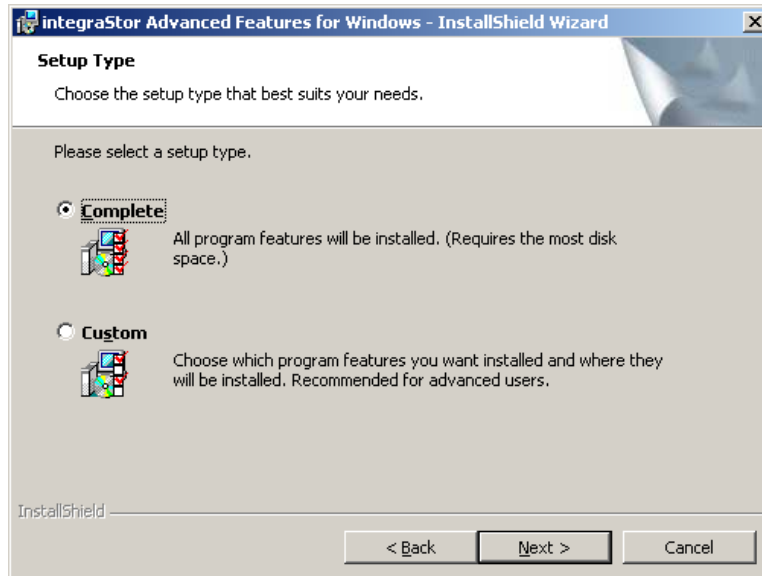


Figure 2-6. Installation Options

- f. Figure 2-7 appears if you selected the Custom option above. You can disable the installation of the CLI for Windows and then click Next.

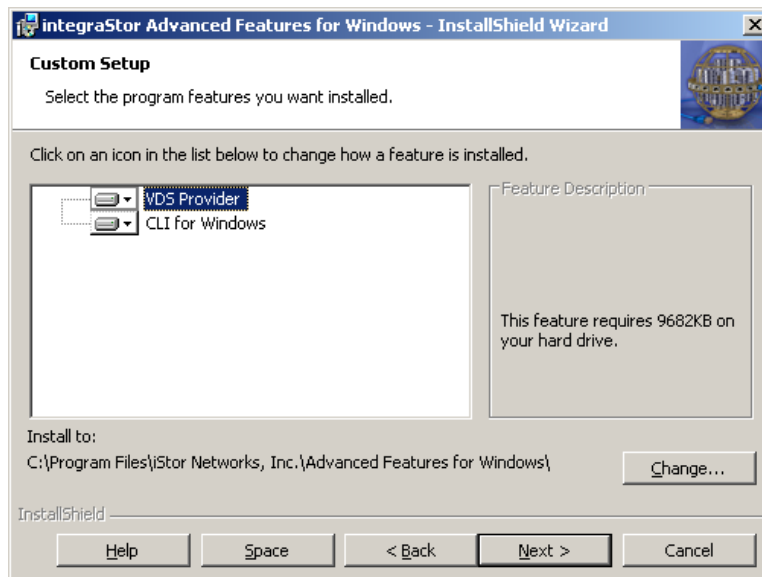


Figure 2-7. Custom Installation Options

- g. When the screen in Figure 2-8 appears, click **Install** to start the installation.

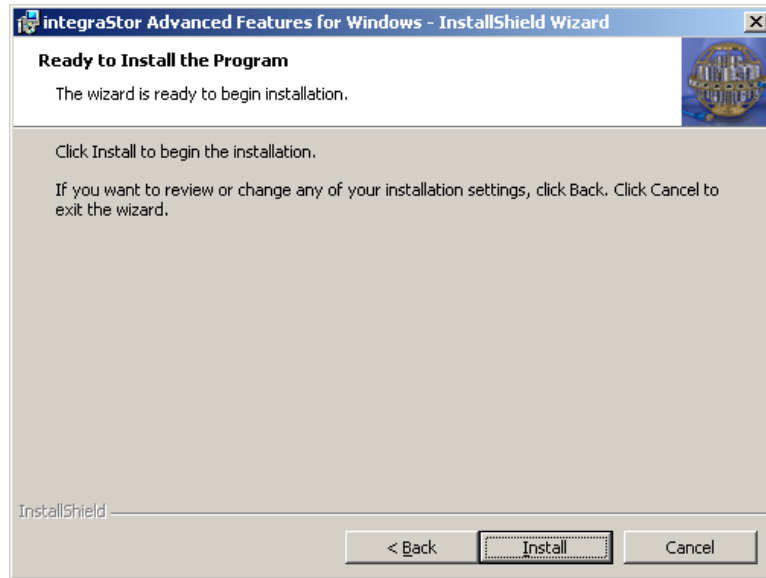


Figure 2-8. Ready to Install the Program Screen

- h. A dialog with a progress bar will indicate the progress of the installation. When the screen in Figure 2-9 appears, click **Finish**.

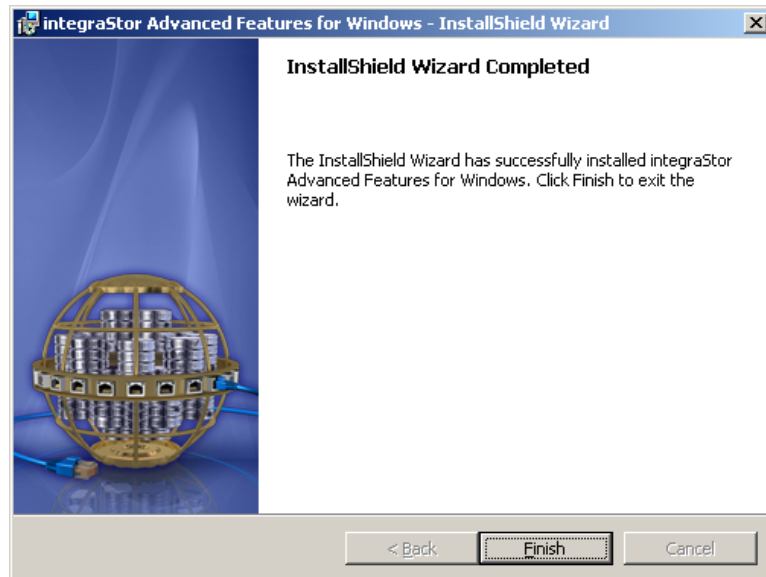


Figure 2-9. InstallShield Wizard Completed Screen

Installation is now complete and the iStor VDS Hardware Provider Control Panel Applet appears in the Microsoft Windows Control Panel, as shown in Figure 2-10. For information about using the iStor VDS Hardware Provider Control Panel Applet, refer to Chapter 3.

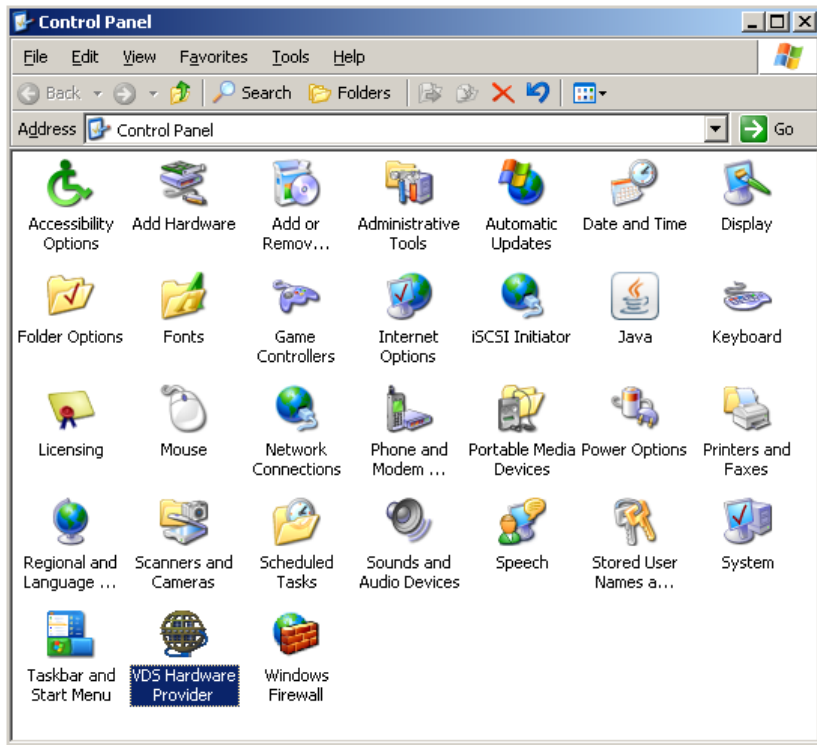


Figure 2-10. iStor VDS Hardware Provider in the Windows Control Panel

## Chapter 3 Using the VDS Hardware Provider

The iStor VDS Hardware Provider Control Panel Applet is used to configure the Windows Server 2003 R2 connection to the IP address of the iStor system's management port. This connection requires authentication to the iStor storage system. As you add connections, be sure to enter the appropriate user name and password for managing the iStor storage system.

### 3.1 Starting the VDS Hardware Provider Control Panel Applet

The VDS Hardware Provider Control Panel Applet can be found in either:

- The Windows Start Menu under **All Programs > iStor Networks, Inc. > integraStor Advanced Features For Windows > integraStor VDS Hardware Provider**

OR

- In the Control Panel, under the icon labeled **integraStor VDS Hardware Provider**



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On a Windows Server 2008 or Windows Vista system, you must launch the VDS Hardware Provider using the Windows Start Menu with "administrator" privileges. You cannot use the Control Panel icon to launch the VDS Hardware Provider.

---

#### 3.1.1 Adding a New Connection

To add a new connection:

1. From the dialog box in Figure 3-1, click the **Add** button.

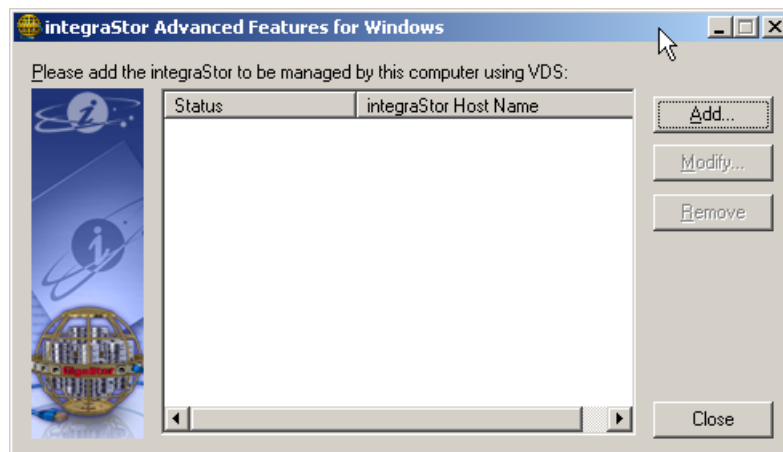


Figure 3-1. VDS Hardware Provider Dialog Box

2. When the Edit Connection dialog box in Figure 3-2 appears, enter the IP address of the storage system's management port, along with the username and password used to manage the storage system.

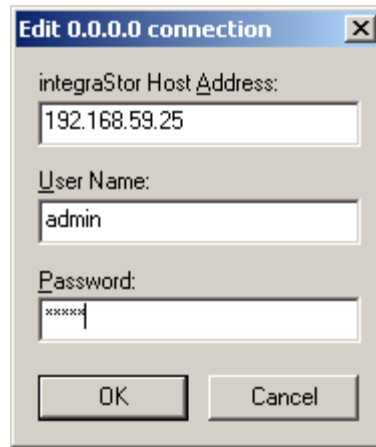


Figure 3-2. Edit Connection Dialog Box

3. Click OK. The connection is added to the list and you are now logged in to the storage system (connection is confirmed in the dialog box, as shown in Figure 3-3).

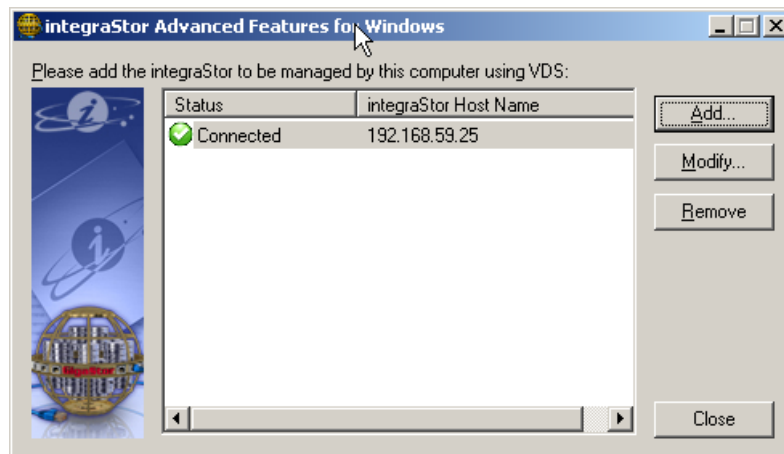


Figure 3-3. Adding a Connection to the List

4. Click Close.



---

If an invalid IP address is selected, you may encounter a timeout period while the applet searches for the IP address and determines the host is unreachable.

---

### 3.1.2 Removing an Existing Connection

To remove an existing connection (192.168.56.134, in this example):

1. Click the **Remove** button (see Figure 3-4).
2. When prompted, confirm the deletion.

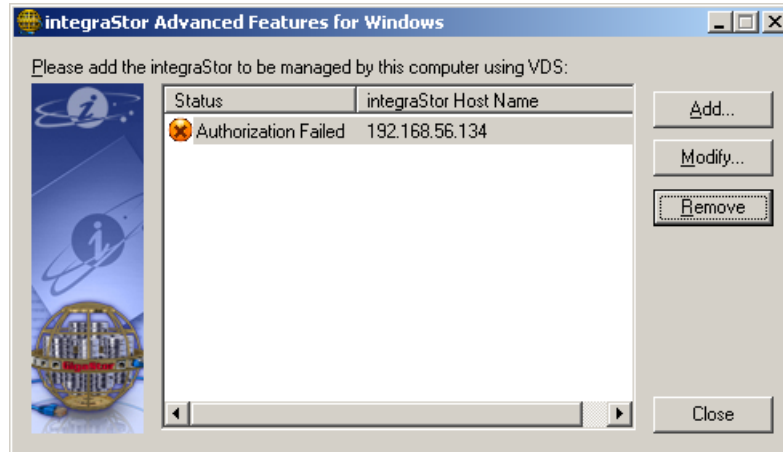


Figure 3-4. Example of Removing an Existing Connection

### 3.1.3 Modifying an Existing Connection

To modify an existing connection (for example, changing from 192.168.56.134 to 192.168.59.25):

1. From the dialog box in Figure 3-5, click the **Modify** button. The same dialog box that appeared when you added a connection reappears, this time with an IP address, user name, and password (see Figure 3-6). For security, stars are shown for each password character.

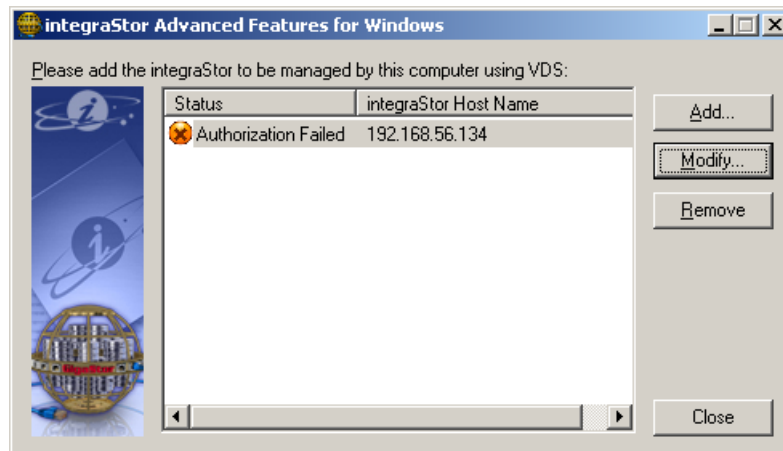


Figure 3-5. Screen for Modifying an Existing Connection

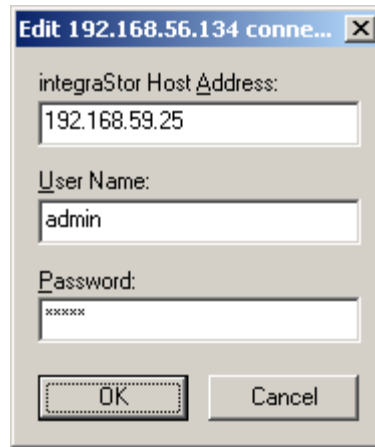


Figure 3-6. Dialog Box for Modifying an Existing Connection

2. Edit the host address for the iStor storage system, user name, and/or password as necessary.
3. When you finish, click OK.

The VDS Hardware Provider Control Panel Applet also displays a status for each connection. The possible statuses are shown in Table 3-1.

Table 3-1. Connection Status

Displayed Status	Description
<Blank> (Unknown)	The control panel applet is attempting to connect.
Not reachable	The IP address entered for the management port is not reachable over the network from the local Microsoft Windows host.
Authorization Failed	Either authentication of the username and password has failed, or the firmware of the iStor storage system to which you are trying to connect is incompatible with the version of the VDS Hardware Provider you have installed.
Connected	The connection is operating correctly.
Connection Lost	The VDS Hardware Provider was connected correctly to the management port, but has lost the connection.

It is considered best practice to close the Advanced Features for Windows while performing other management operations on the iStor storage system.

## 3.2 VDS Support

iStor Networks, Inc. has added support for managing the iStor storage system via Microsoft Virtual Disk Services (VDS) version 1.1 available on Microsoft Windows 2003 R2 by including a VDS Hardware Provider in the Advanced Features for Windows installation. VDS is a generic management application programming interface (API) designed to encourage application developers to incorporate management of underlying storage into any software application that runs on Microsoft Windows 2003 R2.

Microsoft Windows 2003 R2 ships with a command line VDS client called DiskRAID and a traditional Windows VDS client called Storage Manager for SANs. The VDS Hardware Provider is the software that enables management of the iStor storage system and other VDS-enabled storage products by DiskRAID, Storage Manager for SANs, and other VDS-enabled management tools. The VDS Hardware Provider enables Volume and Target creation as well as granting access to iSCSI initiators and logging them in.

There are third-party applications that use VDS for management, and therefore, are capable of managing an iStor storage system simply by installing the VDS Hardware Provider.

Once a connection to the management port of the iStor storage system has been established by the Advanced Features for Windows Control Panel Applet, the VDS Hardware Provider will be ready to use automatically and there will be no further configuration necessary.

All interface to the VDS Hardware Provider is accomplished through Microsoft DiskRAID and Microsoft Storage Manager for SANs, or through third-party VDS enabled applications. For more information, please refer to the documentation provided by Microsoft for DiskRAID and Storage Manager for SANs.

Microsoft VDS does not support adding or removing target portals from the subsystem. Therefore, portals must be created in the iStor Management Center or using the Startup Wizard before running VDS management applications. When unmasking a LUN to an initiator, and no portals are associated with the target, ALL portals will be associated with the target automatically to allow immediate log in by the initiator.

Since Microsoft VDS is designed to work with many types of storage devices, there are a variety of specific VDS features that are supported by each storage device. Section 3.3 describes the features supported by iStor's VDS implementation.

### 3.3 VDS Supported Features

For advanced users, the following VDS features are supported by the VDS Hardware Provider.

- **IVdsProvider, IVdsProviderPrivate, IVdsProviderSupport, IVdsHwProvider, IVdsHwProviderPrivate Interfaces** - the VDS provider object identifies the iStor provider itself, and has no direct relationship with any specific iStor storage system or connection.
- **IVdsSubsystem, IVdsSubsystemIscsi, IVdsSubsystemNaming Interfaces** - the subsystem object represents each connection added via the VDS Hardware Provider Control Panel Applet. The VDS Hardware Provider can communicate with multiple iStor storage systems concurrently at different IP addresses, so long as their software revision is compatible with the VDS Hardware Provider. The subsystem interface for the VDS Hardware Provider represents a single connection to an iStor storage system. The identification of the iStor storage system is the host address.
- **IVdsController Interface** - the controller in the VDS Hardware Provider interface is the physical iStor storage system controller. VDS identifies which LUNs are associated with a controller. The volumes in the iStor storage system are associated with pools and pools are associated with load balance groups. The load balance group is associated with one active controller at a time. The VDS Hardware Provider associates the LUN with the controller based on the active load balance group that is visible to VDS. In a system that is not configured for high availability, a controller shutdown or restart shuts down the entire iStor storage system.
- **IVdsLun, IVdsLunNaming, IVdsLunIscsi, IVdsLun Interfaces** - Microsoft Windows VDS identifies volumes as LUNs. They are not the LUNs or LUs that are modeled by the iStor SMI-S implementation. LUNs are identified by binary naa values from the SCSI Inquiry Data and Vital Product Data pages 0x80 and 0x83. They support grow, but not shrink. The VDS hints that correspond to the iStor storage system's volume composition definition used for LUN creation and reconfiguration are shown in Table 3-2.

Table 3-2. VDS Hints

Volume Composition	VDS Hints
JBOD	VDS_VT_SIMPLE or VDS_VT_SPAN or (VDS_LT_NON_FAULT_TOLERANT and not VDS_HINT_ISYANKABLE and not VDS_HINT_MOSTLYREADS) or (VDS_LT_DEFAULT and not VDS_HINT_ISYANKABLE and not VDS_HINT_MOSTLYREADS)
Stripe	VDS_LT_STRIPE or (VDS_LT_DEFAULT and VDS_HINT_MOSTLYREADS and not VDS_HINT_ISYANKABLE ) or (VDS_LT_NON_FAULT_TOLERANT and VDS_HINT_MOSTLYREADS and not VDS_HINT_ISYANKABLE)
Mirror	VDS_LT_MIRROR or (VDS_LT_DEFAULT and VDS_HINT_MOSTLYREADS and VDS_HINT_ISYANKABLE and not VDS_HINT_FASTCRASHRECOVERYREQUIRED and (VDS_HINT_OPTIMIZEFORSEQUENTIALREADS or VDS_HINT_OPTIMIZEFORSEQUENTIALWRITES)) or (VDS_LT_FAULT_TOLERANT and VDS_HINT_MOSTLYREADS and VDS_HINT_ISYANKABLE and not VDS_HINT_FASTCRASHRECOVERYREQUIRED and (VDS_HINT_OPTIMIZEFORSEQUENTIALREADS or VDS_HINT_OPTIMIZEFORSEQUENTIALWRITES))
Stripe Mirror	(VDS_LT_DEFAULT and VDS_HINT_ISYANKABLE and MOSTLYREADS and not VDS_HINT_FASTCRASHRECOVERYREQUIRED and not (VDS_HINT_OPTIMIZEFORSEQUENTIALREADS or VDS_HINT_OPTIMIZEFORSEQUENTIALWRITES)) or (VDS_LT_FAULT_TOLERANT and VDS_HINT_MOSTLYREADS and VDS_HINT_ISYANKABLE and not VDS_HINT_FASTCRASHRECOVERYREQUIRED and not (VDS_HINT_OPTIMIZEFORSEQUENTIALREADS or VDS_HINT_OPTIMIZEFORSEQUENTIALWRITES))
Parity	VDS_LT_PARITY or (VDS_LT_DEFAULT and VDS_HINT_FASTCRASHRECOVERYREQUIRED and VDS_HINT_MOSTLYREADS and VDS_HINT_ISYANKABLE and (VDS_HINT_OPTIMIZEFORSEQUENTIALREADS or VDS_HINT_OPTIMIZEFORSEQUENTIALWRITES)) or (VDS_LT_FAULT_TOLERANT and VDS_HINT_FASTCRASHRECOVERYREQUIRED and VDS_HINT_MOSTLYREADS and VDS_HINT_ISYANKABLE and (VDS_HINT_OPTIMIZEFORSEQUENTIALREADS or VDS_HINT_OPTIMIZEFORSEQUENTIALWRITES))

- **IVdsIscsiTarget Interface** - the name of targets in the VDS Hardware Provider are their durable names, but their friendly names are the name of the target in the iStor storage system. There is a one-to-one relationship between targets and portal groups inside the iStor storage system. QueryPortalGroups always returns one and only one portal group.
- **IVdsIscsiPortal Interface** - VDS does not support adding or removing target portals from the subsystem. Therefore portals must be created in the iStor Management Center or the Startup Wizard prior to running VDS management applications. When unmasking a LUN to an initiator, and no portals are associated with the target, ALL portals will be associated with the target automatically to allow immediate log in by the initiator.
- **Portal Group Interface** - the portal group interface pulls its values from the iStor storage system target. This is why the tag property returns the durable name of the associated target. Each target has one and only one portal group.

### 3.4 VDS Unsupported Features

For advanced users, the following list identifies Microsoft VDS features NOT supported by the VDS Hardware Provider.

- **IVdsSubsystem Interface** - the subsystem interface does not support the VDS\_SSS\_OFFLINE status for set status.
- **IVdsController Interface** - the controller methods FlushCache and InvalidateCache are not supported. In the SetStatus method, only VDS\_CS\_OFFLINE is supported which performs a shutdown on the controller.
- **IVdsDrive Interface** - the SetStatus method does not support any values other than STATUS\_ONLINE or STATUS\_OFFLINE which move the drives between the available pool and the unusable pool.
- **IVdsLun Interface** - the VDS Hardware Provider interface for LUNs does not support Shrink or any plex methods. Recover is not supported because rebuilds are performed automatically. Similarly, Associate Controllers are not supported, as the volume has an association with a load balance group not a controller in a high-availability system. The QueryPlexes method returns an empty enumeration for the plex list. QueryMaxLunExtendSize is not supported. Volumes in the iStor storage system cannot be placed in an offline or online state, that control is delegated to the target through the initiators list. Therefore SetStatus is not supported.
- **IVdsLunPlex Interface** - LUN plexing is not supported. All LUN RAID support is accomplished through LUN creation and reconfiguration.
- **IVdsScsiTarget Interface** - CreatePortalGroup is not supported.
- **IVdsScsiPortal Interface** - SetStatus is not supported.
- **IVdsScsiPotalGroup Interface** - Delete is not supported.
- **IVdsControllerControllerPort Interface** - controller ports are not supported in the VDS Hardware Provider.

### 3.5 VDS Notifications

VDS hardware providers can provide “Notifications” to inform the Microsoft VDS Service and VDS management applications of changes within the managed storage subsystems. The VDS notifications supported by the VDS Hardware Provider are:

- **Subsystem** - Arrive and Depart.
- **Drive** - Arrive, Depart, and Modify
- **LUN** - Arrive, Depart, and Modify
- **Target** - Arrive, Depart, and Modify
- **Portal** - Arrive and Depart

## Appendix A - Glossary

This section defines some of the technical terms used in this manual.

LUN	Logical Unit Number. The number used by an iSCSI initiator to access a target's Logical Unit. In an iStor storage system configuration, a logical unit is a volume.
LUN Plex	Disk drive component of a LUN / volume. All LUN RAID support is accomplished through LUN creation utilizing LUN plexes.
Portal Group Interface	The portal group interface pulls its values from the iStor storage system target which is why the tag property returns the durable name of the associated target. Each target has one and only one portal group.
Portal Interface	A combination of an IP address, a subnet mask, and a port number. In iSCSI, the standard port is number 3260, which is the port used by the iStor storage system. Each iSCSI Target Node identifies the network portals through which initiators can access the iStor storage system.
Target Interface	An iSCSI target node is an abstract concept that defines a permissible access to an iStor storage system. An iSCSI target node specifies one or more initiators that are allowed access to a set of volumes when logged in through a set of network portals using the specified security.