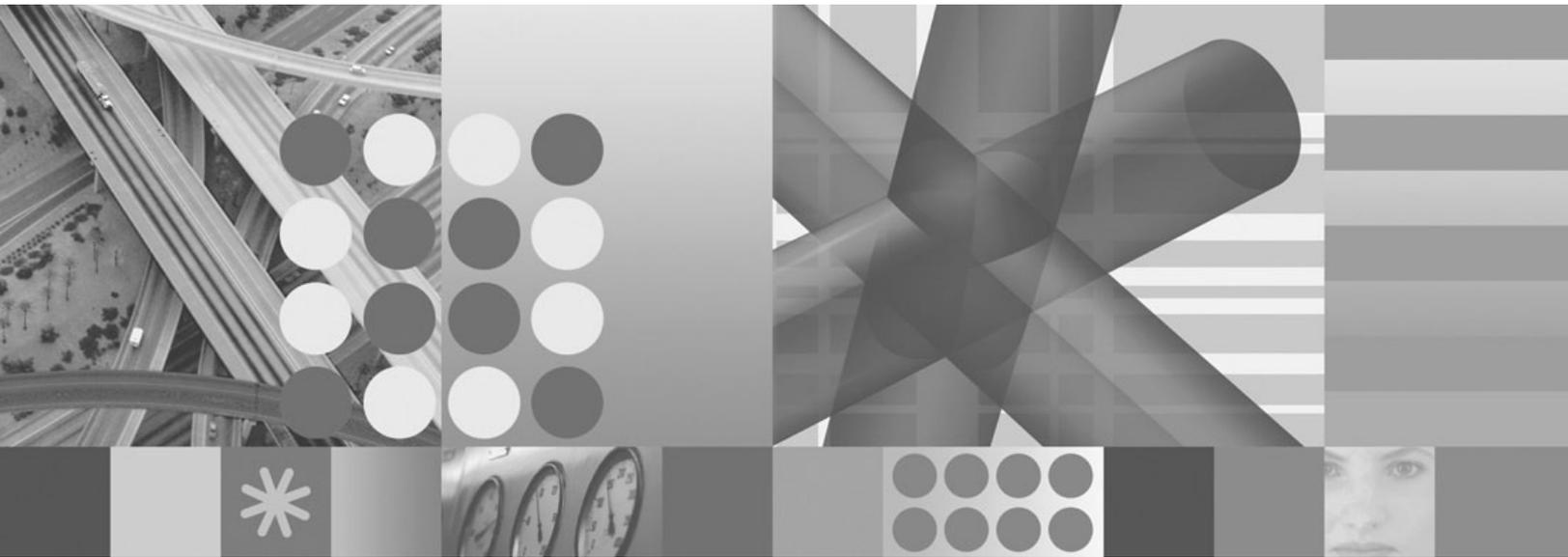




Storage Agent User's Guide



Storage Agent User's Guide

Note!

Before using this information and the product it supports, be sure to read the general information under Appendix C, "Notices," on page 53.

| **Fifth Edition (January 2007)**

| This edition applies to Version 5.4 of IBM Tivoli Storage Manager for SAN for AIX (program numbers 5608-HSM, 5608-ISM, 5608-ISX, 5608-SAN, and 5608-ARM) and to any subsequent releases until otherwise indicated in new editions or technical newsletters.

| Changes since the December 2004 edition are marked with a vertical bar (|) in the left margin. Ensure that you are using the correct edition for the level of the product.

| Order publications through your sales representative or the branch office that serves your locality.

| Your feedback is important in helping to provide the most accurate and high-quality information. If you have any comments about this book or any other IBM Tivoli Storage Manager documentation, please see "Support Information" on page viii.

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About This Book

This guide is for administrators who install and use the storage agent component of the IBM® Tivoli® Storage Manager for Storage Area Networks product (referred to as *storage agent* throughout this publication). It provides:

- An overview of LAN-free data transfer
- Detailed explanations for installing, configuring, and using the IBM Tivoli Storage Manager (Tivoli Storage Manager) client and storage agent, and the Tivoli Storage Manager server

You should be familiar with Tivoli Storage Manager, storage area network (SAN), and AIX® operating system administration. If you need additional information while configuring the storage agent environment, refer to the list of Tivoli Storage Manager publications in “Where to Look for Information” on page vi.

For information on the Internet about Tivoli Storage Manager, see www.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html.

How to Use This Book

If you have not installed and configured the storage agent before, the following steps serve as a guide for the information in this book:

1. Confirm the type of environment in which you will be installing and configuring the storage agent. There are three:
 - ACSLS, SCSI, and 349X Tape Library sharing
 - File device sharing using software such as Tivoli SANergy® or IBM TotalStorage SAN File System. For current information about supported file-sharing software, see www.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html.
 - External library (ACSLs-managed)

See “Types of Environments” on page 5 for complete descriptions of the types of environments.

2. Confirm that your configuration meets the system requirements. These requirements are listed in “System Requirements” on page 12.
3. Having confirmed the environment and the system requirements, it is recommended that you gather several pieces of client and server information that will speed the installation and configuration of the storage agent.
Gather client and server information that will speed the installation and configuration of the storage agent. Use the two forms in “Configuration Information Worksheets” on page 13.
4. Finally, depending on the type of configuration you have, you will need to go to either of two chapters:
 - If you have a ACSLS, SCSI, or 349X Tape Library sharing or a file device sharing configuration, go to Chapter 3, “Installing and Configuring Tape-Library and File-Device Sharing Environments,” on page 17.
 - If you have an external library configuration, go to Chapter 4, “Installing and Configuring External Library Environments,” on page 31.

Where to Look for Information

The following information describes the service that IBM provides for Tivoli Storage Manager and tells you where to look for more information about Tivoli Storage Manager products.

IBM Tivoli Storage Manager Publications

This section lists publications in the IBM Tivoli Storage Manager library and related documents. It also describes how to access Tivoli publications online and how to order Tivoli publications.

IBM Tivoli Storage Manager Library

The following documents are available in the Tivoli Storage Manager library:

Publication Title	Order Number
<i>IBM Tivoli Storage Management Products License Information</i>	GH09-4572
<i>IBM Tivoli Storage Manager Messages</i>	SC32-0140
<i>IBM Tivoli Storage Manager for AIX Administrator's Guide</i>	SC32-0117
<i>IBM Tivoli Storage Manager for AIX Administrator's Reference</i>	SC32-0123
<i>IBM Tivoli Storage Manager for AIX Installation Guide</i>	SC32-0134
<i>IBM Tivoli Storage Manager Basic Concepts Poster</i>	SC32-9464

The following table lists Tivoli Storage Manager storage agent publications.

Publication Title	Order Number
<i>IBM Tivoli Storage Manager for SAN for AIX Storage Agent User's Guide</i>	SC32-0129
<i>IBM Tivoli Storage Manager for SAN for HP-UX Storage Agent User's Guide</i>	SC32-0130
<i>IBM Tivoli Storage Manager for SAN for Linux Storage Agent User's Guide</i>	SC32-0131
<i>IBM Tivoli Storage Manager for SAN for Sun Solaris Storage Agent User's Guide</i>	SC32-0132
<i>IBM Tivoli Storage Manager for SAN for Windows Storage Agent User's Guide</i>	SC32-0133

The following table lists Tivoli Storage Manager client publications.

Publication Title	Order Number
<i>IBM Tivoli Storage Manager for Space Management for UNIX and Linux: User's Guide</i>	SC32-0148
<i>IBM Tivoli Storage Manager for Macintosh: Backup-Archive Clients Installation and User's Guide</i>	SC32-0143
<i>IBM Tivoli Storage Manager for NetWare: Backup-Archive Clients Installation and User's Guide</i>	SC32-0144
<i>IBM Tivoli Storage Manager for UNIX and Linux: Backup-Archive Clients Installation and User's Guide</i>	SC32-0145
<i>IBM Tivoli Storage Manager for Windows: Backup-Archive Clients Installation and User's Guide</i>	SC32-0146

Publication Title	Order Number
<i>IBM Tivoli Storage Manager Using the Application Program Interface</i>	SC32-0147

The following table lists publications for application protection products.

Publication Title	Order Number
<i>IBM Tivoli Storage Manager for Application Servers: Data Protection for WebSphere Application Server Installation and User's Guide</i>	SC32-9075
<i>IBM Tivoli Storage Manager for Databases: Data Protection for Microsoft SQL Server Installation and User's Guide</i>	SC32-9059
<i>IBM Tivoli Storage Manager for Databases: Data Protection for Oracle for UNIX and Linux Installation and User's Guide</i>	SC32-9064
<i>IBM Tivoli Storage Manager for Databases: Data Protection for Oracle for Windows Installation and User's Guide</i>	SC32-9065
<i>IBM Tivoli Storage Manager for Databases: Data Protection for Informix Installation and User's Guide</i>	SH26-4095
<i>IBM Tivoli Storage Manager for Enterprise Resource Planning: Data Protection for mySAP Installation and User's Guide for DB2</i>	SC33-6341
<i>IBM Tivoli Storage Manager for Enterprise Resource Planning: Data Protection for mySAP Installation and User's Guide for Oracle</i>	SC33-6340
<i>IBM Tivoli Storage Manager for Hardware: Data Protection for EMC Symmetrix for R/3 Installation and User's Guide</i>	SC33-6386
<i>IBM Tivoli Storage Manager for Hardware: Data Protection for Enterprise Storage Server for DB2 UDB Installation and User's Guide</i>	SC32-9060
<i>IBM Tivoli Storage Manager for Hardware: Data Protection for FlashCopy Devices for Oracle Installation and User's Guide</i>	GC32-1772
<i>IBM Tivoli Storage Manager for Hardware: Data Protection for FlashCopy Devices for mySAP Installation and User's Guide for DB2 UDB</i>	SC33-8208
<i>IBM Tivoli Storage Manager for Hardware: Data Protection for FlashCopy Devices for mySAP Installation and User's Guide for Oracle</i>	SC33-8207
<i>IBM Tivoli Storage Manager for Mail: Data Protection for Lotus Domino for UNIX, Linux, and OS/400 Installation and User's Guide</i>	SC32-9056
<i>IBM Tivoli Storage Manager for Mail: Data Protection for Lotus Domino for Windows Installation and User's Guide</i>	SC32-9057
<i>IBM Tivoli Storage Manager for Mail: z/OS Edition Licensed Program Specifications</i>	GC32-0838
<i>IBM Tivoli Storage Manager for Mail: Data Protection for Microsoft Exchange Server Installation and User's Guide</i>	SC32-9058

Related IBM Publications

The following table lists related IBM products publications.

Title	Order Number
<i>IBM Magstar 3494 Tape Library Introduction and Planning Guide</i>	GA32-0279
<i>IBM 3490E Model E01 and E11 User's Guide</i>	GA32-0298
<i>IBM Magstar MP 3570 Tape Subsystem Operator's Guide</i>	GA32-0345
<i>IBM TotalStorage Tape Device Drivers Installation and User's Guide</i>	GC35-0154

Title	Order Number
<i>IBM TotalStorage Enterprise Tape System 3590 Operator Guide</i>	GA32-0330
<i>IBM Magstar 3494 Tape Library Dataserver Operator Guide</i>	GA32-0280
<i>IBM TotalStorage Enterprise Tape System 3592 Operator Guide</i>	GA32-0465
<i>IBM TotalStorage SAN File System Administrator's Guide and Reference</i>	GA27-4317
<i>IBM Tivoli SANergy Administrator's Guide</i>	GC26-7389

Accessing Publications Online

The product CD contains the publications that are in the product library. The format of the publications is PDF, HTML, or both. To access the publications using a Web browser, open the `infocenter.html` file. The file is in the appropriate publications directory on the product CD.

IBM posts publications for this and all other Tivoli products, as they become available and whenever they are updated, to the Tivoli software information center Web site. Access the Tivoli software information center by first going to the Tivoli software library at the following Web address:

<http://www.ibm.com/software/tivoli/library/>

Scroll down and click the **Product manuals** link. In the Tivoli Technical Product Documents Alphabetical Listing window, click the <**Tivoli Storage Manager**> link to access the product library at the Tivoli software information center.

Note: If you print PDF documents on other than letter-sized paper, set the option in the **File → Print** window that allows Adobe Reader to print letter-sized pages on your local paper.

Ordering Publications

You can order many Tivoli publications online at the following Web site:

www.elink.ibm.com/public/applications/publications/cgibin/pbi.cgi

You can also order publications in the United States by calling 800-879-2755.

Tivoli Technical Training

For Tivoli technical training information, refer to the following IBM Tivoli Education Web site:

<http://www.ibm.com/software/tivoli/education>

Support Information

This section describes the following options for obtaining support for IBM products:

- “Searching knowledge bases” on page ix
- “Obtaining fixes” on page ix
- “Contacting IBM Software Support” on page ix

Searching knowledge bases

If you have a problem with your IBM software, begin by searching the available knowledge bases to determine whether the resolution to your problem is already documented.

Search the information center on your local system or network: IBM Tivoli Storage Manager provides an information center on a CD. You can run the information center from the CD, or copy it to your local computer or an intranet server. You can use the search function of this information center to query conceptual information, instructions for completing tasks, reference information, and support documents.

Search the Internet: If you cannot find an answer to your question in the information center, search the Internet for the latest, most complete information that might help you resolve your problem. To search multiple Internet resources for your product, go to the support web site for the product www.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html and look for the section to search the support knowledge base. From this section, you can search a variety of resources including:

- IBM technotes
- IBM downloads
- IBM Redbooks™
- Forums and newsgroups

Obtaining fixes

A product fix might be available to resolve your problem. You can determine what fixes are available for your IBM software product by checking the product support Web site:

1. Go to the Tivoli Storage Manager support Web site (www.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html).
2. From this page you can view all product downloads or search for specific fixes.

To receive weekly e-mail notifications about fixes and other news about IBM products, follow these steps:

1. From the support page for any IBM product, click **My support** in the upper-right corner of the page.
2. If you have already registered, skip to the next step. If you have not registered, click register in the upper-right corner of the support page to establish your user ID and password.
3. Sign in to **My support**.
4. On the My support page, click **Edit profiles** in the left navigation pane, and scroll to **Select Mail Preferences**. Select a product family and check the appropriate boxes for the type of information you want.
5. Click **Submit**.
6. For e-mail notification for other products, repeat Steps 4 and 5.

For more information about types of fixes, see the *Software Support Handbook* (<http://techsupport.services.ibm.com/guides/handbook.html>).

Contacting IBM Software Support

IBM Software Support provides assistance with product defects.

Before contacting IBM Software Support, your company must have an active IBM software maintenance contract, and you must be authorized to submit problems to IBM. The type of software maintenance contract that you need depends on the type of product you have:

- For IBM distributed software products (including, but not limited to, Tivoli, Lotus®, and Rational® products, as well as DB2® and WebSphere® products that run on Windows® or UNIX® operating systems), enroll in Passport Advantage® in one of the following ways:
 - **Online:** Go to the Passport Advantage Web page (www.lotus.com/services/passport.nsf/WebDocs/Passport_Advantage_Home) and click **How to Enroll**
 - **By phone:** For the phone number to call in your country, go to the IBM Software Support Web site (<http://techsupport.services.ibm.com/guides/contacts.html>) and click the name of your geographic region.
- For IBM eServer™ software products (including, but not limited to, DB2 and WebSphere products that run in zSeries®, pSeries®, and iSeries™ environments), you can purchase a software maintenance agreement by working directly with an IBM sales representative or an IBM Business Partner. For more information about support for eServer software products, go to the IBM Technical Support Advantage Web page (<http://www.ibm.com/servers/eserver/techsupport.html>).

If you are not sure what type of software maintenance contract you need, call 1-800-IBMSERV (1-800-426-7378) in the United States or, from other countries, go to the contacts page of the IBM Software Support Handbook on the Web (<http://techsupport.services.ibm.com/guides/contacts.html>) and click the name of your geographic region for phone numbers of people who provide support for your location.

Follow the steps in this topic to contact IBM Software Support:

1. Determine the business impact of your problem.
2. Describe your problem and gather background information.
3. Submit your problem to IBM Software Support.

Determine the business impact of your problem: When you report a problem to IBM, you are asked to supply a severity level. Therefore, you need to understand and assess the business impact of the problem you are reporting. Use the following criteria:

Severity 1	Critical business impact: You are unable to use the program, resulting in a critical impact on operations. This condition requires an immediate solution.
Severity 2	Significant business impact: The program is usable but is severely limited.
Severity 3	Some business impact: The program is usable with less significant features (not critical to operations) unavailable.
Severity 4	Minimal business impact: The problem causes little impact on operations, or a reasonable circumvention to the problem has been implemented.

Describe your problem and gather background information: When explaining a problem to IBM, be as specific as possible. Include all relevant background information so that IBM Software Support specialists can help you solve the problem efficiently. To save time, know the answers to these questions:

- What software versions were you running when the problem occurred?
- Do you have logs, traces, and messages that are related to the problem symptoms? IBM Software Support is likely to ask for this information.
- Can the problem be re-created? If so, what steps led to the failure?
- Have any changes been made to the system? (For example, hardware, operating system, networking software, and so on.)
- Are you currently using a workaround for this problem? If so, please be prepared to explain it when you report the problem.

Submit your problem to IBM Software Support: You can submit your problem in one of two ways:

- **Online:** Go to the "Submit and track problems" page on the IBM Software Support site (<http://www.ibm.com/software/support/probsub.html>). Enter your information into the appropriate problem submission tool.
- **By phone:** For the phone number to call in your country, go to the contacts page of the IBM Software Support Handbook on the Web (<http://techsupport.services.ibm.com/guides/contacts.html>) and click the name of your geographic region.

If the problem you submit is for a software defect or for missing or inaccurate documentation, IBM Software Support creates an Authorized Program Analysis Report (APAR). The APAR describes the problem in detail. Whenever possible, IBM Software Support provides a workaround for you to implement until the APAR is resolved and a fix is delivered. IBM publishes resolved APARs on the IBM product support Web pages daily, so that other users who experience the same problem can benefit from the same resolutions.

For more information about problem resolution, see "Searching knowledge bases" on page ix and "Obtaining fixes" on page ix.

Conventions Used in This Guide

- Command to be entered on the AIX command line:
`> dsmadm`
- Command to be entered on the command line of an administrative client:
`query devclass`

Changes for IBM Tivoli Storage Manager Version 5

This section summarizes changes that have been made to the Tivoli Storage Manager product and this publication.

Changes for IBM Tivoli Storage Manager Version 5 Release 4 — January 2007

The following changes have been made to the product for this edition:

Query Disk Space in a FILE Device Class

The new command QUERY DIRSPACE lets you display the amount of total and available disk space for each directory in a FILE device class.

For details, see the *Administrator's Reference*.

General Updates

Updates based on the input of users have been made throughout the book.

Changes for IBM Tivoli Storage Manager Version 5 Release 3 — October 2005

The following changes have been made to the product for this edition:

General Updates

Updates based on the input of users have been made throughout the book.

Format volumes for z/OS LAN-free operations

For LAN-free operations, Tivoli Storage Manager previously required an operation such as MOVE DATA or LAN-based backup to write data to the tape so that it could be used from open systems. You can continue to use this method. However, with this release, you can configure Tivoli Storage Manager server to quickly and easily format LAN-free-capable volumes dynamically when they are requested by the storage agent.

For full details, refer to the *IBM Tivoli Storage Manager for z/OS Administrator's Guide* and *IBM Tivoli Storage Manager for z/OS Administrator's Reference*.

Changes for IBM Tivoli Storage Manager Version 5 Release 3 — December 2004

The following changes have been made to the product for this edition:

General Updates

Updates based on the input of users have been made throughout the book.

Automated Cartridge System Library Software (ACSL) Enhancements

ACSL library sharing is available. See "ACSL, SCSI and 349X Tape Library Sharing" on page 6 for more information.

Multiple file system support for FILE device types

IBM Tivoli Storage Manager server improvements to sequential-access FILE device type and random-access DISK device class storage requires that the storage agent be able to access newly created FILE volumes. See "Disk Devices" on page 28 for information.

Minimum I/O to Volumes Associated with FILE Device Class

In Tivoli Storage Manager Version 5.3, the minimum I/O to a volume associated with a FILE device class is 256 KB, regardless how much data is being written to the volume. For example, if you are backing up one 500-byte object, it will take 256 KB of I/O to store it on the volume. In terms of performance, the size of the I/O for a volume associated with a FILE device class has the greatest impact when backing up or archiving a large number of small objects (for example, small files or small directories).

To reduce the potential for performance degradation, you can increase the size of aggregates created by the server. (An aggregate is an object that contains multiple logical files that are backed up or archived from a client in a single transaction.) To increase the size of aggregates, increase the value of the TXNGROUPMAX option in the server options file (dsm.serv.opt) or increase the value of the TXNGROUPMAX parameter on the REGISTER NODE or UPDATE NODE server commands. In addition to increasing the TXNGROUPMAX value, you might also need to increase the values for the following options:

- The client option TXNBYTELIMIT in the client options file (dsm.opt)
- The server options MOVEBATCHSIZE and MOVESIZETHRESH

For details about the server options and commands, refer to the *Administrator's Reference*. For details about the client option TXNBYTELIMIT, refer to the *Backup-Archive Clients Installation and User's Guide*.

Note: For certain tasks (for example, using content-management products, using the DIRMC client option to store directory information, or migrating very small files using the hierarchical space management (HSM) client), you can minimize wasted space on storage volumes in a FILE-type storage pool by specifying the NONBLOCK data format when defining the storage pool. In most situations, however, the NATIVE format is preferred.

Changes for IBM Tivoli Storage Manager Version 5 Release 2—January 2004

The following changes have been made to the product for this edition:

General Updates

Updates based on the input of users have been made throughout the book. A new section for automating the storage agent startup has also been added. See “Automating the Storage Agent Startup” on page 43 for more information.

Changes for IBM Tivoli Storage Manager Version 5 Release 2—June 2003

The following changes have been made to the product for this edition:

LAN-free for z/OS

Tivoli Storage Manager now supports LAN-free data movement in storage area network (SAN) environments on the z/OS® and OS/390® operating systems. The z/OS or OS/390 server acts as the data manager for a client that uses a storage agent. See Chapter 2, “Planning,” on page 5 for an

overview of this function. For full details, refer to the *IBM Tivoli Storage Manager for z/OS Administrator's Guide* and *IBM Tivoli Storage Manager for z/OS Administrator's Reference*.

Product Packaging and Name Changes

Product packaging and names for Tivoli Storage Manager have been updated. See www.ibm.com/software/tivoli/solutions/storage/ for complete details.

Configuration Information Worksheets

Client and server configuration information worksheets have been added to the Planning chapter to aid the user in more quickly installing and configuring the storage agent. See "Configuration Information Worksheets" on page 13 for details.

Chapter 1. Storage Agent Overview

IBM Tivoli Storage Manager for Storage Area Networks is a feature of Tivoli Storage Manager that enables LAN-free client data movement.

This feature allows the client system to directly write data to, or read data from, storage devices attached to a storage area network (SAN), instead of passing or receiving the information over the network. Data movement is thereby off-loaded from the LAN and from the Tivoli Storage Manager server, making network bandwidth available for other uses. For instance, using the SAN for client data movement decreases the load on the Tivoli Storage Manager server and allows it to support a greater number of concurrent client connections. See Figure 1 on page 2. The storage agent, a component of the feature, makes LAN-free data movement possible.

The storage agent can support several clients while installed on only one of the clients. You can install the storage agent on a client machine that shares storage resources with the Tivoli Storage Manager server (Figure 1 on page 2) or on a client machine that does not share storage resources but is connected to a client machine that does share storage resources with the Tivoli Storage Manager server. Figure 2 on page 2 shows multiple clients connected to a client machine that contains the storage agent. You must specify the LANFREECOMMMETHOD option in the client system options file (dsm.sys) to allow the client machine (that shares storage resources) to communicate with the storage agent. A Tivoli Storage Manager server, acting as a library manager, controls the storage devices. This server may be the server working in conjunction with the storage agent or another Tivoli Storage Manager server in the enterprise. The Tivoli Storage Manager server keeps track of the metadata that the client has stored. The metadata, such as policy information and file name and size, is passed over the LAN connection between the storage agent and server.

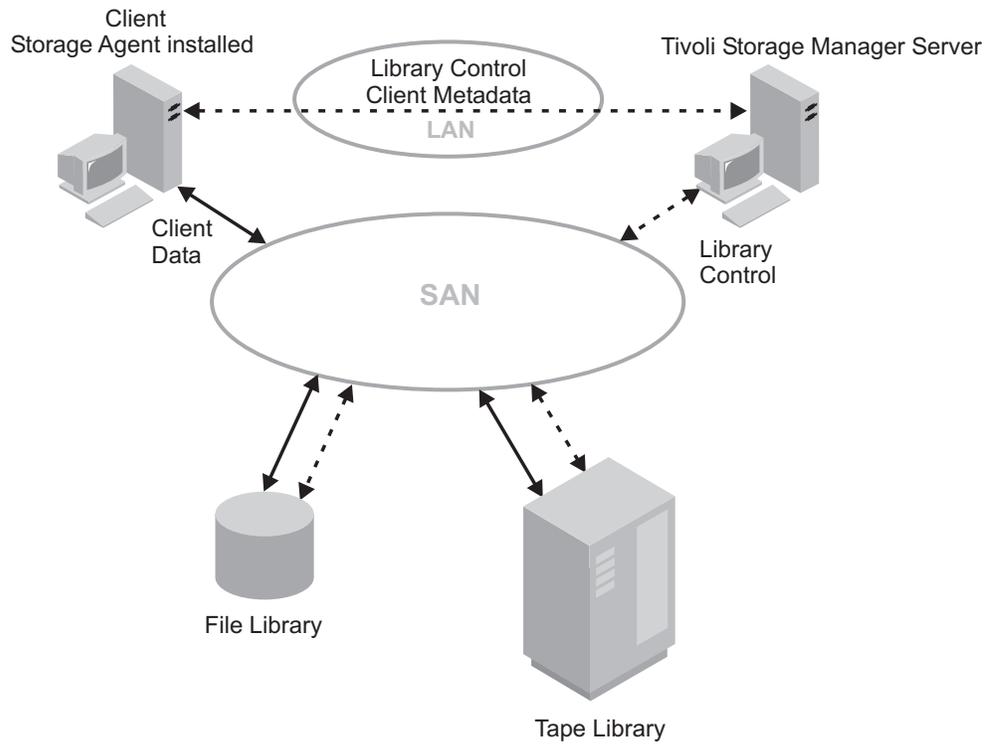


Figure 1. SAN Data Movement. Solid lines indicate data movement. Broken lines indicate movement of control information and metadata.

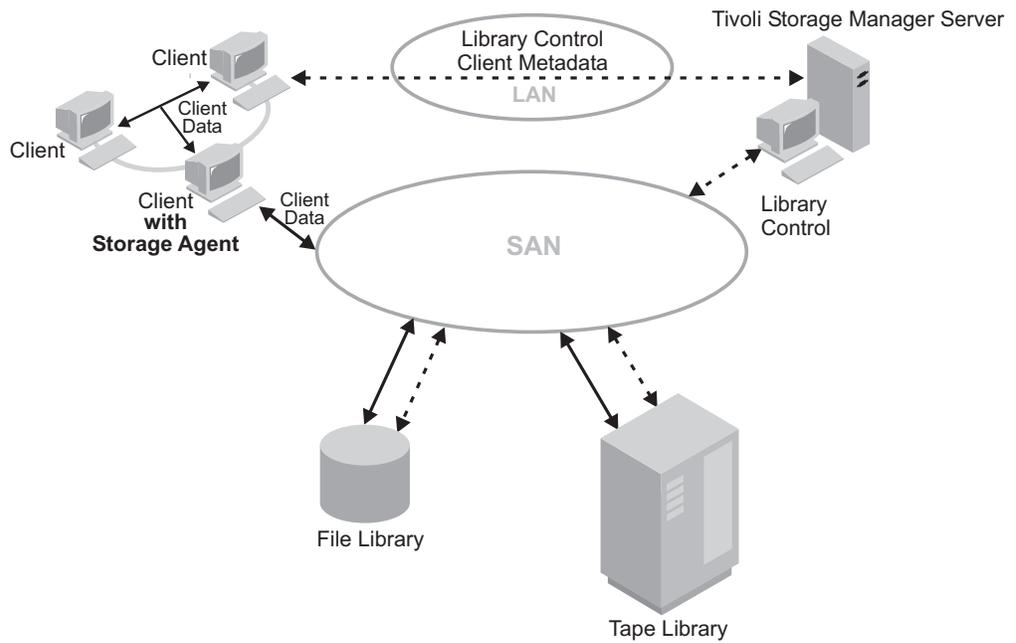


Figure 2. SAN Data Movement with the LANFREECOMMMETHOD option. Solid lines indicate data movement. Broken lines indicate movement of control information and metadata. The LANFREECOMMMETHOD option allows the storage agent to support several clients while installed on only one of the clients.

The storage agent communicates with the server to obtain and store database information and to coordinate device and volume access. The server and client coordinate and negotiate data access through the SAN. The client will use the storage agent for operations where appropriate. For example, if a SAN path is defined, the client (by means of the storage agent) transfers data on that path. If a failure occurs on the SAN path, failover occurs and the client uses its LAN connection to the Tivoli Storage Manager server and moves the client data over the LAN.

There are cases when the storage agent can send the data directly to the server using the LAN control paths between the storage agent and the server. An example of this would be a LAN-free storage pool that is updated to read-only after the client connects to the server and obtains its initial policy information. The storage agent, instead of failing the operation, will send the data to the server, and, providing that the storage hierarchy is configured so that the next storage pool destination is available, the server will handle the operation. You can also prevent data from transferring over the LAN by specifying the Tivoli Storage Manager server parameters `DATAREADPATH` and `DATAWRITEPATH` with the `REGISTER NODE` or `UPDATE NODE` commands for the desired node. These settings can be reviewed by issuing the following command on the server for this node:

```
query node node_name format=detailed
```

Tivoli Storage Manager supports SAN-attached device sharing in one of the following ways:

- Tivoli Storage Manager native library management support consisting of a library manager and library clients or just a library manager. See “ACSLs, SCSI and 349X Tape Library Sharing” on page 6 for details regarding libraries.
- Shared disk storage using a FILE library and the integration of Tivoli SANergy, IBM TotalStorage SAN File System or other supported file-sharing software. For current information about supported file-sharing software, see www.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html.
- External libraries as defined in the *Administrator's Guide* in the appendix, “External Media Management Interface Description.”

For additional information about these configurations, see “Types of Environments” on page 5.

LAN-free Client Data Backup Scenario

The following outlines a typical backup scenario for a Tivoli Storage Manager client that uses SAN data movement:

1. The client begins a backup operation. The server reports policy information to the client, including whether a destination is LAN-free. As the client assigns policy settings for files during backup processing, it sends the data LAN-free when the destination for that policy is LAN-free enabled.

A storage pool is a LAN-free destination when the storage pool uses a device shared on a SAN. That device must also have a defined path between the device and the storage agent.

2. The storage agent receives data for those files backed up by the client and assigned to policy settings that use a LAN-free enabled storage pool. The storage agent sends a request for a volume mount to the library manager server. In the external library case, the storage agent contacts the external library manager, using the provided path to the executable.

3. A request is made to the storage device to mount the appropriate media.
4. The library manager notifies the storage agent of the location where the mounted media resides. In the external library case, the storage agent is informed of the device location by the external library manager.
5. The client, by means of the storage agent, writes the backup data directly to the device over the SAN.
6. The storage agent sends metadata information to the Tivoli Storage Manager server, and the server stores the information in its database.

Multi-session No-Query Restore for LAN-free Path

When performing a no-query restore, the Tivoli Storage Manager server builds a list of files to restore and sends data to the client while continuing to build the list. This allows the restore to be restarted if interrupted.

Multiple sessions are used for the no-query restore when data for the restore resides on devices with a LAN-free path and devices with a LAN-only path. Some sessions restore data from the server with a LAN-only path. The other sessions use the storage agent to restore data over the LAN-free path. This works only with clients at Version 4.2 or above.

Note that the number of sessions used for the restore is dependent on the value of the client RESOURCEUTILIZATION option and the number of server volumes that contain the client data to be restored.

The following outlines a typical multi-session no-query restore for a LAN-free path:

1. The client requests a file space to be restored. This request is forwarded to the server.
2. The server determines the files to restore and the volume on which those files reside. The server generates a list, sorted by the volume name.
3. The client is informed of the progress and the number of volumes. The client can start more sessions to restore the information.
4. The location of the volume, and whether or not the storage agent can access the volume, will determine how the data is handled. When the volume can be mounted on a shared device that the storage agent can access, the data is read from the volume by the storage agent and sent to the client. When the volume cannot be mounted on a shared device that the storage agent can access, the data is read from the volume by the server and sent directly to the client. The client then begins additional sessions: some to the storage agent for the volumes that are LAN-free enabled and some sessions to the server for those volumes that are not LAN-free enabled.
5. The process repeats until all files in the list are restored.

Chapter 2. Planning

You can set up IBM Tivoli Storage Manager for Storage Area Networks in a number of environments. Planning the system configuration provides a smooth transition through system setup and into production. As part of your planning, you need to identify the following:

- Which environment to implement.
- Devices to be used for LAN-free data movement.
- The clients that will use LAN-free data movement.
- The server that will manage particular clients' data.
- The library used for the LAN-free enabled device. If the library is a Tivoli Storage Manager shared library, you must identify the Tivoli Storage Manager server that is the library manager. If the library is an externally managed library using StorageTek ACSLS, you must identify the control point.

Supported Operating Systems

In addition to setting up the storage agent on AIX, you can set it up on the following operating systems:

- Linux[®]
- HP-UX
- Sun Solaris
- Windows

The storage agents on the operating systems listed above can work in conjunction with a Tivoli Storage Manager server on any of the platforms listed. In addition to the platforms listed, the storage agent can also work in conjunction with a Tivoli Storage Manager server on z/OS. However, you must install and configure another server to function as the library manager or implement external library support through an external library manager (for example, Gresham's EDT-DistribuTAPE). You can install this library-manager server on any of the platforms listed. Full details on using the storage agent with z/OS and OS/390 are given in the *IBM Tivoli Storage Manager for z/OS Administrator's Guide* and the *IBM Tivoli Storage Manager for z/OS Administrator's Reference*.

Types of Environments

There are different types of configurations that take advantage of what can be accomplished using a storage agent in a LAN-free environment. Your environment is dependent upon the type of storage device you will be using for LAN-free data storage. The following sections cover descriptions and planning considerations for several typical LAN-free environments. These environments are:

- A shared ACSLS, SCSI, and 349X Tape Library
- A shared file device using Tivoli SANergy, IBM TotalStorage SAN File System, or other supported file-sharing software. For current information about supported file-sharing software, see www.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html.
- An External Library as defined in the *Administrator's Guide* in the appendix, "External Media Management Interface Description."

- Cluster environment. See the Redbook *IBM Tivoli Storage Manager in a Clustered Environment* for details on configuring the storage agent in an HACMP™ environment.

ACSLs, SCSI and 349X Tape Library Sharing

When Tivoli Storage Manager servers share an ACSLS, SCSI tape, or 349X storage device using a library manager and library clients, one server, the *library manager*, owns and controls the tape library device. The library manager operations include checking volumes into and out of the library, labeling volumes, mounting and dismounting volumes, auditing volumes, and tracking an inventory of library contents. The storage agents, along with other Tivoli Storage Manager servers that share this library, are considered *library clients*. As a library client, the storage agent is able to store data and request drives, tapes, and volumes.

When the Tivoli Storage Manager server (data manager server) is also the library manager for the devices where data is stored by the storage agent, then the storage agent communicates requests to this Tivoli Storage Manager server. When the Tivoli Storage Manager server (data manager server) is another library client, then the storage agent communicates requests for itself or the metadata server directly to the library manager.

Note that when using a shared ACSLS library, the library manager must be a Tivoli Storage Manager server on AIX, Solaris, or Windows.

A library client requests shared library resources, such as drives or media, from the library manager, but uses the resources independently. The library manager coordinates the access to these resources. Data moves over the SAN between the storage device and either the library manager or the library client. Either the library manager or any library client can manage the LAN-free movement of client data as long as the client system includes a storage agent.

In this library-sharing environment, the most important relationship is the one between the server and the storage agent. The server, working in conjunction with the storage agent, manages the storage hierarchy. The server could be a library client or library manager, and it is responsible for:

- Migrations
- Expiration of files based on policy information
- Reclamation of free space on volumes and consolidation of the volumes
- Disaster recovery

The storage agent contributes information to the storage hierarchy through various operations, but this role is independent of the library sharing role.

The library manager and library client configurations are represented in Figure 3 on page 7 and Figure 4 on page 8.

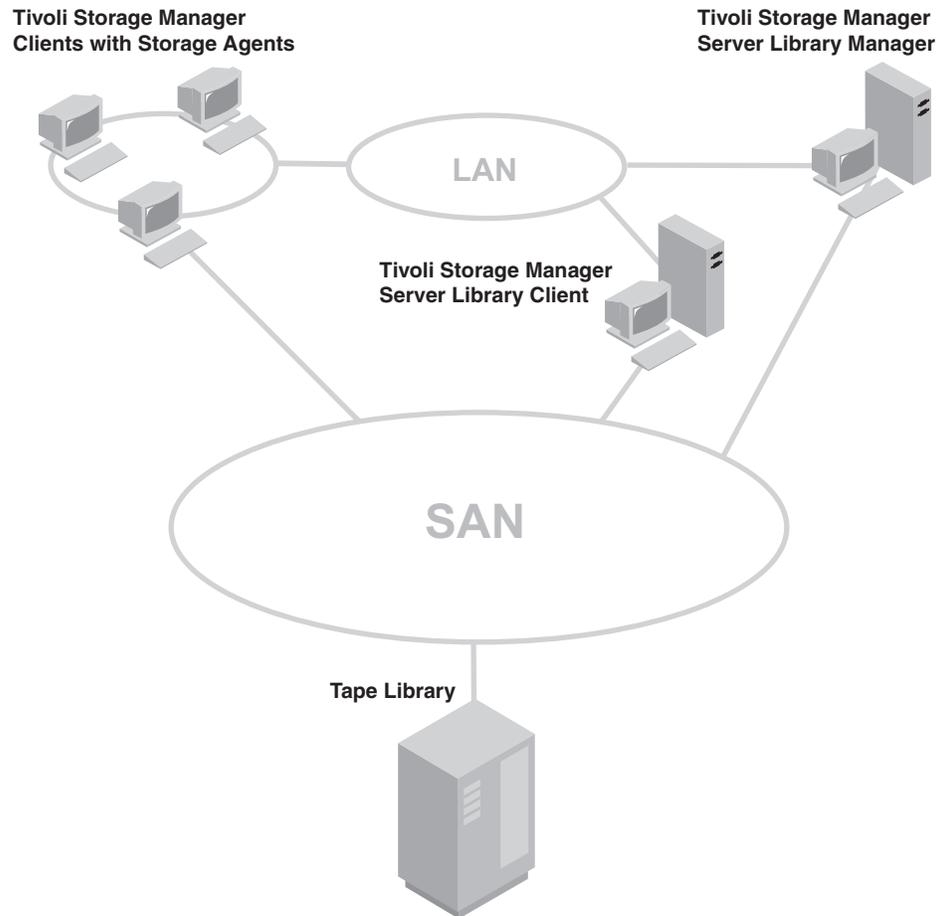


Figure 3. Library Manager and Client LAN-free Configuration

Notes:

1. An environment can have a library manager without a library client.
2. In an environment where ACSLS library support is required, the library client can reside on a Tivoli Storage Manager server on AIX, Linux, HP-UX, Solaris, Windows, or z/OS. The library manager must reside on a Tivoli Storage Manager server on AIX, Solaris, or Windows.

The configurations in Figure 3 are the following:

- A Tivoli Storage Manager server library manager manages a client's data, which is stored on a tape library.
- A Tivoli Storage Manager server library client manages a client's data, which is stored on a tape library.

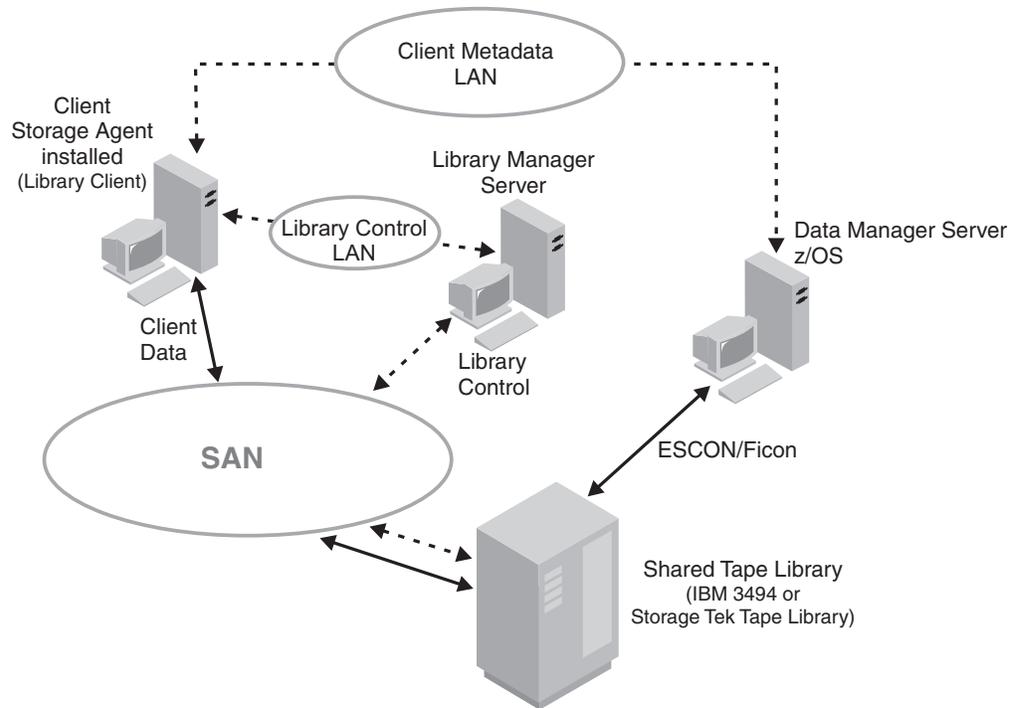


Figure 4. Library Manager and Client LAN-free Configuration on z/OS

The following are requirements for the library manager server:

- If your environment consists of native ACSLS support with a StorageTek tape library, the library manager server can be a Tivoli Storage Manager server residing on an AIX, Solaris, or Windows operating system.
- If your environment consists of an IBM 3494 tape library, the library manager server can be a Tivoli Storage Manager server residing on an AIX, HP-UX, Linux, Solaris, or Windows operating system.
- Both environments can support the storage agent (library client) on an AIX, HP-UX, Linux, Solaris, or Windows operating system.

Note: When using a server running on a z/OS system with shared library support and a 3494 automated tape library, you must configure a Tivoli Storage Manager server on AIX, Linux, HP-UX, Solaris, or Windows as a library manager to control storage agent mount requests. When using a StorageTek library controlled by StorageTek LibraryStation software, you must configure an AIX, Solaris, or Windows server as a library manager with ACSLS support to control storage agent mount requests.

File Device Sharing Using Tivoli SANergy

Note: SANergy is just one option for file-sharing software. IBM TotalStorage SAN File System is another. For current information about supported file-sharing software, see www.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html.

When Tivoli Storage Manager servers share access to disk storage, the environment contains a shared file device class (Tivoli Storage Manager server FILE device class) and utilizes the SANergy product. SANergy provides a file sharing accelerator. Because you will be using a FILE library, you must determine where the Tivoli SANergy client and the Tivoli SANergy Metadata Controller (MDC) will be installed. You will also require a Windows share (CIFS) or a Network File Share (NFS) on a UNIX system to achieve file sharing. Note that the Tivoli SANergy license (included with the storage agent media) is provided with Tivoli Storage Manager only for supporting LAN-free backup to disk. See Figure 5 for the possible Tivoli SANergy configurations. (Refer to the SANergy publications for additional information about configuring SANergy.)

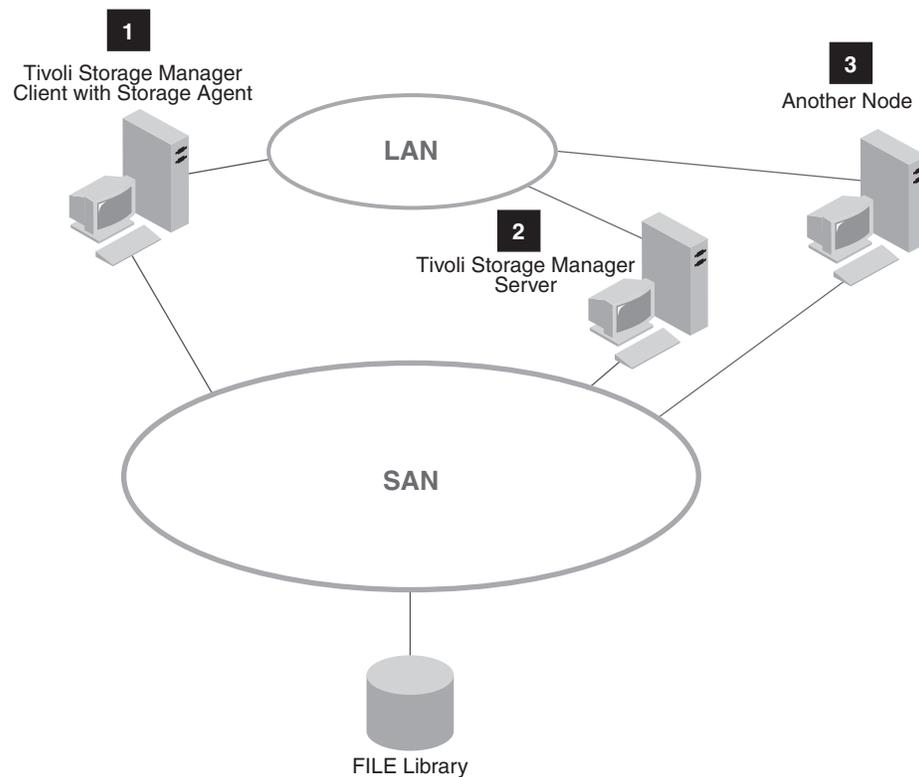


Figure 5. Tivoli SANergy Configurations

One possible configuration is for the Tivoli SANergy client to be installed on the Tivoli Storage Manager client machine (**1**) and the Tivoli SANergy MDC to be installed on the Tivoli Storage Manager server (**2**). These configurations can also consist of multiple platforms. For example, an environment can consist of a Sun MDC working with Windows and AIX clients.

External Libraries

If Tivoli Storage Manager native library support (as described in “ACSLs, SCSI and 349X Tape Library Sharing” on page 6) cannot be used, the alternative is to

configure external library support. This section illustrates how to use Gresham EDT-DistribuTAPE as an external library manager via StorageTek ACSLS.

External library support is an alternative library resource when the environment is unable to satisfy library resource sharing requirements with Tivoli Storage Manager library sharing support for SCSI, 3494, and ACSLS (Library Station) managed libraries. A typical external library configuration includes using an external library manager such as Gresham EDT-DistribuTAPE. See Figure 6 on page 11.

The ACSLS Server or the LibraryStation on z/OS manages the physical aspects of tape cartridge storage and retrieval. The external library manager, for instance, Gresham EDT, communicates with the ACSLS Server or the LibraryStation on z/OS to access tape cartridges in an automated StorageTek library. The storage agent installed on a machine containing Gresham EDT and a Tivoli Storage Manager backup-archive client or a Tivoli Storage Manager data protection application client provides access to SAN-attached storage devices resulting in LAN-free data movement. The continued connection to the LAN provides a metadata (control information) path. If the storage agent is not available, the LAN provides a failover path for data backup and recovery.

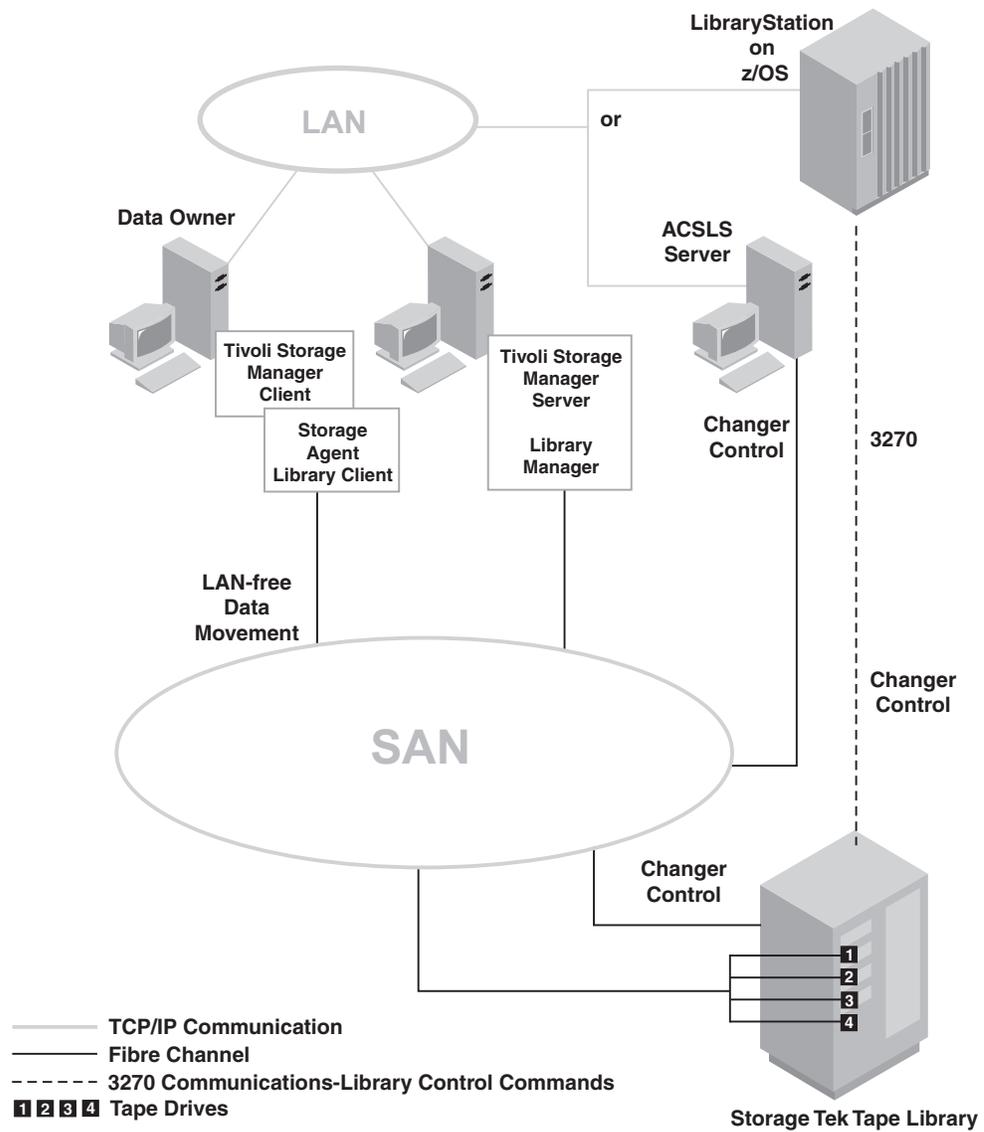


Figure 6. ACSLS Library Environment

For detailed installation, configuration, and system administration of ACSLS, refer to the appropriate StorageTek documentation. For detailed installation, configuration, data migration, and system administration of Gresham EDT-DistribuTAPE, refer to the *Gresham EDT User's Manual*.

Data Migration and Coexistence

If you currently have data associated with the Tivoli Storage Manager ACSLS library type and want to take advantage of LAN-free, you will need to consider coexistence and migration issues. See Appendix B, "Legacy ACSLS Data Migration and Coexistence," on page 51.

If you currently have data stored from using external library support for ACSLS library access and plan to migrate to a native Tivoli Storage Manager library sharing support environment, see the "Configuring Storage Devices" chapter in the *Administrator's Guide* for detailed information.

System Requirements

To use LAN-free data movement, configure the following components at the latest available software levels.

- Your SAN configuration must meet the applicable hardware and software requirements (see www.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html).
- TCP/IP is required for communication among the Tivoli Storage Manager server, the client, and the storage agent.
- An IBM Tivoli Storage Manager server that has a license for LAN-free operations (Version 5.4 or later). To ensure compatibility between the server and the storage agent, check the Tivoli Web site at www.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html for maintenance level requirements and download the latest Fix Pack Level. The Tivoli Storage Manager servers for the z/OS, OS/390, AIX, HP-UX, Linux, Sun Solaris, and Windows operating systems support LAN-free data movement. Note that the Tivoli Storage Manager server supports storage agents at the same version, release, and modification level, plus up to two modification levels earlier. Suppose in the future IBM released Version 5.4.3 of the Tivoli Storage Manager server. It would support storage agents at the Version 5.4.3, Version 5.4.2, and Version 5.4.1 levels. Note that this Tivoli Storage Manager Version 5.4.3 server example is an example only and is neither a promise nor guarantee that such a version will be released. This compatibility is subject to change at IBM's discretion. Review the readme for a given server level for the latest information related to compatibility. Tivoli Storage Manager Version 5.4.0 servers will also support Version 5.3.4 and Version 5.3.5 storage agents.
- In order for storage agents to access volumes from a storage pool that utilizes 3592 generation 2 drive encryption, both the storage agent and its server must be at a level that supports drive encryption (Version 5.3.4.0 or higher).
- A Tivoli Storage Manager client or a Tivoli Storage Manager data protection application client. Client software must be installed on a client system (check www.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html for the clients that are currently supporting LAN-free data movement). File library sharing support requires that the storage agent be at the 5.4 level.
- When using the Tivoli Storage Manager application programming interface (API) or the application client, the API software must be at version 5.2 or higher. You can obtain the API by downloading the latest version of the backup-archive client for AIX from the Web site at www.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html.
- If you are sharing disk storage, Tivoli SANergy or IBM TotalStorage SAN File System must be installed. Tivoli SANergy version 3.2.13 is included with the storage agent media. Note that the use of the Tivoli SANergy components included with the IBM Tivoli Storage Manager for Storage Area Networks product is limited to use to enable LAN-free backup and restore to disk in conjunction with your licensed use of the IBM Tivoli Storage Manager for Storage Area Networks product. For current information about supported file-sharing software, see www.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html.

Note: If you are sharing only tape devices, file-sharing software is not required.

- If you are using external library support in conjunction with the Gresham product, Gresham EDT DistribuTAPE 6.4.4 (or later) must be installed. For additional information and product download, see www.greshamstorage.com.

Configuration Information Worksheets

Use the following worksheets to record information about your client and server systems that you will need when you install and configure the storage agent.

Definitions for the terms in the worksheets are given in the worksheets.

Table 1. Client System Configuration Information

Client System	
Storage agent properties	
Enter information about the storage agent that you will need when you define the storage agent as a server to the Tivoli Storage Manager server.	
Name: Enter the name for the storage agent. For example, enter storagt.	
Password: Enter the password for the storage agent. For example, enter fun4me.	
TCP/IP address: Enter the TCP/IP address of the storage agent. For example, enter agent.tucson.ibm.com.	
TCP/IP port: Enter the TCP/IP port of the client system.	
Client options	
LAN-free communications method (lanfreecommethod client option): Circle the communications method you choose for the LAN-free data movement function. For more information, see the lanfreecommethod option in the <i>IBM Tivoli Storage Manager for UNIX and Linux: Backup-Archive Clients Installation and User's Guide</i> .	TCP/IP SharedMemory
LAN-free port (lanfreetcpport client option): Enter the TCP/IP port used for the LAN-free data movement function.	
Device information	
External library	
Executable location: Enter the fully qualified path to the external library manager executable for each storage agent to which Tivoli Storage Manager can send media access requests.	
Library name: Enter a name of your choosing that is less than or equal to 32 characters.	
ACSLs, 3494, or SCSI drive device names	
Enter the names of the tape drives for which you will define paths. See "Obtain Device Information" on page 15 for information on how to obtain the drive names.	
Drive 1	
Drive 2	
Drive 3	

Table 1. Client System Configuration Information (continued)

Client System	
Drive 4	
Shared disk	
Local path name: Enter the name of the local path to the network-mounted file system. For example, enter /shareddisk.	

Table 2. Server System Configuration Information

Server System	
Server properties	
Enter information about the Tivoli Storage Manager server that the storage agent will need to communicate with the server. You can verify the server information by issuing the QUERY STATUS command from a Tivoli Storage Manager administrative command line.	
Name: Enter the name of the server. For example, enter tsmsrver.	
Password: Enter the password for the server. For example, enter not4u.	
TCP/IP address: Enter the TCP/IP address for the server. For example, enter tsmsrver.tucson.ibm.com.	
TCP/IP port: Enter the TCP/IP port for the server. For example, enter 1502.	
Device information	
External library	
Executable location: Enter the fully qualified path to the external library manager executable for each storage agent to which Tivoli Storage Manager can send media access requests.	
Library name: Enter a name of your choosing that is less than or equal to 32 characters.	
ACSLs, 3494, or SCSI library information	
Library name: Enter the name of an ACSLS, 3494, or SCSI library.	
Library device name: Enter the device name for an ACSLS, 3494, or SCSI library, which you will use when you define the path.	
ACSLs, 3494, or SCSI drive device names	
Enter the names of the tape drives for which you will define paths. See "Obtain Device Information" on page 15 for information on how to obtain the drive names.	
Drive 1	
Drive 2	
Drive 3	
Drive 4	
Shared disk	
Local path name: Enter the name of the local path to the network-mounted file system. For example, enter /shareddisk.	
Client node names	

Table 2. Server System Configuration Information (continued)

Server System
Record the names of the client nodes on which you will install and configure the storage agent. This information will be needed when you register the nodes, set the policy for them, and place any needed restrictions on them. See "Client Node Information" for further details.

Obtain Device Information

Note: If you are configuring a FILE Library, you do not need to obtain device information. Proceed to "Step 3. Configuring Devices for the Storage Agent to Access" on page 26.

On the system where the storage agent is installed, obtain device (tape and disk) information. You will use the device information from the storage agent when defining paths for the server that functions as the library manager in "Step 3. Configuring Devices for the Storage Agent to Access" on page 26. In the z/OS environment, you would use the information for an AIX server because the z/OS servers cannot function as library managers.

On the system where the storage agent is installed, use SMIT and issue the following commands to obtain information about tape devices.

- For IBM devices:
Select Devices -> Tape Drive -> List All Defined Tape Drives
- For other devices:
Devices -> Tivoli Storage Manager -> Optical R/W Disk Drive or Tape Drive or Library/Medium Changer -> List All Defined devices

Client Node Information

Because you will need to take into account node registration and policy information, determine the client nodes that will be using the storage agent. In a typical environment, however, a storage agent is only used by a single node: the client node residing on the same system as the storage agent. Consider these recommendations when determining which client nodes will use the storage agent:

- You will need to verify that those nodes are registered. If they are not, you will need to register them.
- You will also need to verify the policy information for those nodes. The copy group for backup and archive must point to a storage pool that has a LAN-free path for a particular storage agent. LAN-free paths exist when drive paths are defined and available for the storage pool. The procedure in the installation and configuration chapter will create such a path, thus allowing LAN-free data transfer for the node. You can issue the VALIDATE LANFREE command on the server to view the destinations that are capable of LAN-free data movement. Detailed information about this command is available in the *Administrator's Reference*.
- After you have verified the registration and policy information for the nodes, you can place restrictions on when a node can use the LAN-free path.

The node attributes DATAREADPATH and DATAWRITEPATH determine the restriction placed on the node. You can restrict a node to use only the LAN-free path on backup and archive (DATAWRITEPATH), and the LAN path on restore and retrieve (DATAREADPATH). Note that such a restriction can fail a backup or archive operation if the LAN-free path is unavailable. Consult the *Administrator's Reference* for more information regarding these attributes.

- You can configure more than one client to use the same storage agent:
 - If the clients reside on the same system as the storage agent, set the appropriate options and values in the client dsm.sys file.
 - If the clients do not reside on the same system as the storage agent, set the following options with the appropriate values:
 - LANFREECOMMMETHOD TCPIP
 - LANFREETCPSERVERADDRESSSpecify the TCP/IP address for the machine where the storage agent is installed.
 - LANFREETCPPORTSpecify the same TCP/IP port address as specified by the TCPPORT option in the storage agent options file, dsmsta.opt.

Chapter 3. Installing and Configuring Tape-Library and File-Device Sharing Environments

This chapter describes installing and configuring the storage agent LAN-free function in environments that are using one or more of the following:

- A shared ACSLS, SCSI, or 349X tape library. The storage agent can connect to either the library manager or a library client.
- File device sharing using Tivoli SANergy or IBM TotalStorage SAN File System. For current information about supported file-sharing software, see www.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html.

For high-level descriptions of these environments, see Chapter 1, “Storage Agent Overview,” on page 1 and “Types of Environments” on page 5. Before installing and configuring the storage agent, make sure you read Chapter 2, “Planning,” on page 5 and fill out the information forms in “Configuration Information Worksheets” on page 13.

To install and configure the storage agent for LAN-free data movement:

1. Read the overview of the procedure. Make sure you understand the overall process before beginning the procedure because the process takes place on multiple machines at different times.
2. Review the complete procedure which follows the summary.
3. Complete the steps described in the procedure.

You can use the Enable LAN-free Data Movement wizard in the Administration Center interface to set up LAN-free data movement on the server. If you use the wizard, you only need to perform the following steps in this procedure:

- “Install or Upgrade the Client and API Software” on page 19: Step 1 through Step 5 (Step 6 is optional)
- “Install and Configure the Storage Agent” on page 21: Step 14 and Step 15
- “Step 4. (z/OS only) Formatting Volumes for LAN-free Data Movement” on page 28
- “Step 5. Starting the Storage Agent and Verifying the LAN-free Configuration” on page 28: All steps

If you have not used the Enterprise Management LAN-free Wizard to set up LAN-free data movement on the Tivoli Storage Manager server, perform all steps in this procedure.

Overview of Installation and Configuration Tasks

The following overview outlines the installation and configuration tasks provided in this chapter:

- **Step 1: Verifying network configuration**

Note: Ensure that your system meets the prerequisites for the SAN configuration.

- **Step 2: Establishing communications among client, storage agent, and Tivoli Storage Manager server**
 - **Client System: Installing Software**

- Install the Tivoli Storage Manager client or Tivoli Storage Manager data protection application client, and the Tivoli Storage Manager API. Specify the LAN-free option.
- Install and set up the storage agent.
- **IBM Tivoli Storage Manager Server: Defining the storage agent and configuring devices**
 - If your environment is using tape devices, configure the library and drives on the SAN.
 - If your environment is using disk devices, configure Enterprise Management and define the FILE device class. See “Step 2.2 IBM Tivoli Storage Manager Server: Defining the Storage Agent and Configuring Devices” on page 24 for instructions on configuring Enterprise management.
- **Step 3: Configuring devices for the storage agent to access**
 - Tape devices.
 - Disk devices.
- **Step 4: (z/OS only) Formatting Volumes for LAN-free data movement.** Volumes for sequential access storage pools that support LAN-free data movement using the z/OS data manager server require formatting before they can be used. LAN-free sessions will fail if the storage pool does not contain any formatted volumes and does not allow automatic formatting.
- **Step 5: Starting the storage agent and verifying the LAN-free configuration**
 - Start the storage agent.
 - Verify the LAN-free configuration.

Step 1. Verifying the Network Connection

The server system and the client systems must be attached to the SAN along with appropriate storage devices. The server system and the client systems must also be connected by means of a LAN.

The Tivoli Storage Manager for Storage Area Networks feature requires specific levels and models of hardware and software. Ensure that your system configuration meets the hardware and software requirements for the SAN setup. For details, see www.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html.

Note: If you will be using a storage agent with disk media, you must install Tivoli SANergy or IBM TotalStorage SAN File System on the applicable machines. Tivoli SANergy is included with the storage agent media. Note that the use of the Tivoli SANergy components included with the IBM Tivoli Storage Manager for Storage Area Networks product is limited to use to enable LAN-free backup and restore to disk in conjunction with your licensed use of the IBM Tivoli Storage Manager for Storage Area Networks product. See Figure 5 on page 9 for possible Tivoli SANergy configurations. See the *IBM Tivoli SANergy Administrator's Guide* for details.

For information about supported file-sharing software, see www.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html.

Step 2. Establishing Communications among Client, Storage Agent, and Tivoli Storage Manager

Figure 7 shows the results of completing “Step 2.1 Client System: Installing Software” and “Step 2.2 IBM Tivoli Storage Manager Server: Defining the Storage Agent and Configuring Devices” on page 24. Use this figure as a reference point as you work through the steps in this section.

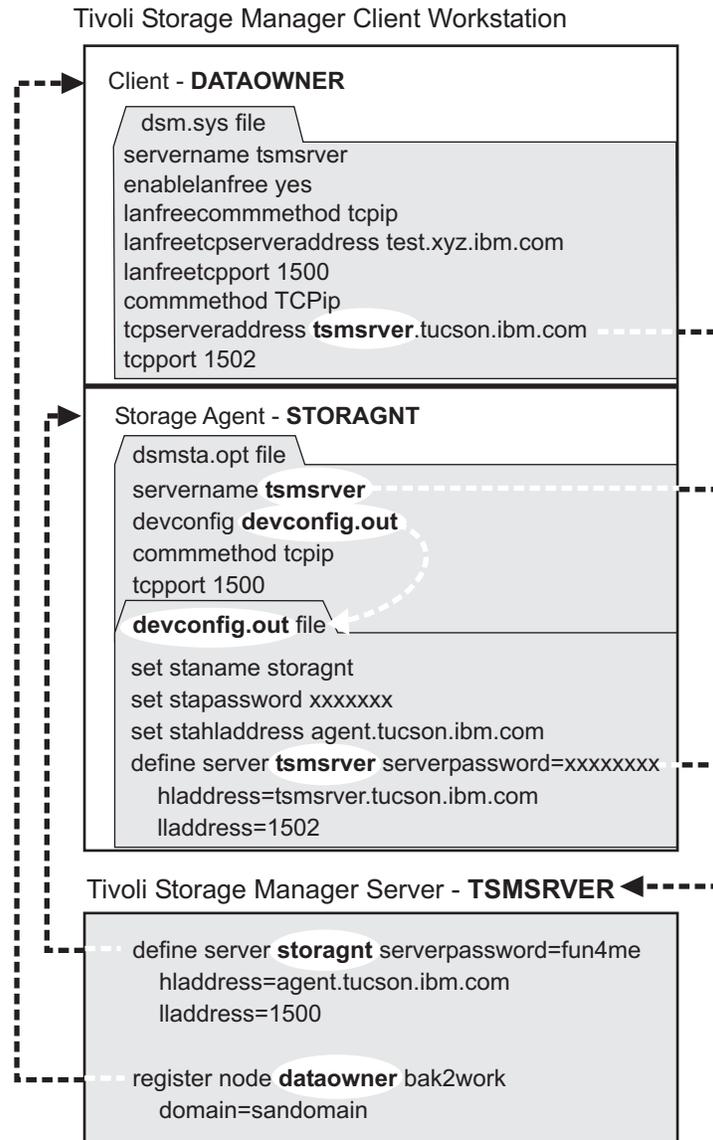


Figure 7. Communications information. Results of Steps 2.1 and 2.2. The passwords are shown as “xxxxxxx” because they are encrypted in the file.

Step 2.1 Client System: Installing Software

The procedures in this step describe installation of the Tivoli Storage Manager client, API, and storage agent software.

Install or Upgrade the Client and API Software

1. Check that the client system meets the prerequisites for client software. See the *Backup-Archive Clients Installation and User's Guide*. Install the client software and

API if not already installed on the system, or upgrade the software to the latest level as necessary. The latest levels can be downloaded from the IBM Tivoli Storage Manager Web site at www.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html. If you are using the storage agent to support multiple clients, you must install or upgrade the client and API software on each client that will be supported.

2. Be sure you have the information recorded on the forms in “Configuration Information Worksheets” on page 13. This information is required in this procedure.
3. Modify the Tivoli Storage Manager options file (dsm.sys). For information about the dsm.opt and dsm.sys files, see the *Backup-Archive Clients Installation and User’s Guide*.
 - a. Locate the options file and open it. The file could be located in one of several places, such as the installation directory, or pointed to by an environment variable.
 - b. Specify the Tivoli Storage Manager server name. This information will come from the client system and server system configuration-information worksheets. For example:


```
servername tsmsrver
```
 - c. Specify the communications method between the client and server.

Table 3. Communications methods

To use this communication method...	Install this software...	To connect to these Tivoli Storage Manager servers...
TCP/IP	TCP/IP (Standard with supported AIX platforms)	AIX, HP-UX, Linux, Solaris, Windows, z/OS
Shared memory	TCP/IP (Standard with supported AIX platforms)	AIX

For more information, see the commethod option in the *IBM Tivoli Storage Manager for UNIX and Linux: Backup-Archive Clients Installation and User’s Guide*. Again, this information will come from the client system and server system configuration-information worksheets, as will the information for the next steps. For example:

```
COMMmethod TCPip
TCPserveraddress tsmsrver.tucson.ibm.com
TCPport 1502
```

Note: A TCPPORT of 1502 is used in the examples; however, the default TCPPORT is 1500.

Keep the file open for the next step.

4. Add the following options to the same dsm.sys stanza edited in step 3c. These options specify that the client will use SAN-attached devices when the path is available, during backup, restore, archive, and retrieve processing.

For more information, see the lanfreecommmethod option in the *IBM Tivoli Storage Manager for UNIX and Linux: Backup-Archive Clients Installation and User’s Guide*.

```
enablelanfree yes
LANFREECommmethod TCPIP
LANFREETCPserveraddress test.xyz.company.com
LANFREETCPport 1500
```

or

```
enablelanfree yes
LANFREECommmethod SharedMem
LANFREESHMPORT 1510
```

5. Edit the `dsm.opt` file to specify the server name that you added to the `dsm.sys` file in step 3b on page 20. In this example:

```
servername tsmsrver
```

6. If you are using a Tivoli Storage Manager data protection application client, configure the API by performing the following procedure:

- a. Set up the environment variables. The Tivoli Storage Manager API uses unique environment variables to locate files.
 - `DSMI_CONFIG` is the fully qualified name for the client user option file.
 - `DSMI_DIR` points to the path containing `dsm.sys`, `dsmtca`, and the subdirectory `en_US`.
 - `en_US` subdirectory must contain `dsmclientV3.cat`.
 - `DSMI_LOG` points to the path for the `dserror.log` file.

The following are examples of how to set up these environment variables:

```
export DSMI_CONFIG=/usr/tivoli/tsm/client/api/bin/dsm.opt
export DSMI_DIR=/usr/tivoli/tsm/client/api/bin
export DSMI_LOG=/home/user_a/logdir
```

Note: The quickest method to set the environment variables is to add these variables to the user's `.profile` file.

- b. Edit an existing stanza or create a new stanza in the `dsm.sys` file to specify the communications options between the Tivoli Storage Manager API and server. For example:

```
SErvername          tsmsrver
COMMmethod          TCPip
enablelanfree       yes
LANFREECommmethod  TCPIP
LANFREETCPServeraddress test.xyz.company.com
LANFREETCPPort      1500
TCPport             1502
TCPServeraddress    tsmsrver.tucson.ibm.com
```

Note: A `TCPPORT` of 1502 is used in the examples; however, the default `TCPPORT` is 1500.

If a `dsm.sys` file does not exist in the directory specified by `DSMI_DIR`, create a symbolic link to the `dsm.sys` file in the Tivoli Storage Manager client installation directory. For example:

```
ln -s /usr/tivoli/tsm/client/ba/bin/dsm.sys /usr/tivoli/tsm/client/api/bin/dsm.sys
```

Install and Configure the Storage Agent

Notes:

1. Refer to the `README` file shipped on the product media for the most current information regarding installing and configuring the storage agent.
2. To reduce workload and processing time and to optimize LAN-free performance, do not install the storage agent and the Tivoli Storage Manager server on the same machine.

Make sure to stop all existing Tivoli Storage Manager products prior to installing the storage agent. Installation will stop when an active Tivoli Storage Manager process is detected. If this occurs, close all active Tivoli Storage Manager products and retry installing the storage agent.

Note that the storage agent honors the Tivoli Storage Manager server environment variables `DSMSERV_CONFIG` and `DSMSERV_DIR`.

Install the storage agent on a client that has connections to the storage resources on the SAN. The default installation directory is `/usr/tivoli/tsm/StorageAgent/bin`.

The instructions in this section are shown using the Software Management and Installation Tool (SMIT). You can also use the Install and Update Software Manager (installm).

Note: Throughout this procedure, `/dev/cd0` is used for CD-ROM. This may be different in your environment. Loading the storage agent files can take several minutes.

Installation using the SMIT procedure:

1. Be sure you have the information recorded on the forms in “Configuration Information Worksheets” on page 13. This information is required in this procedure.
2. Log in as the root user.
3. Load the storage agent CD into the selected drive.
4. From your desktop window, access SMIT and make selections according to the level of your AIX operating system.

Enter:

```
smit install_update &
```

Select:

```
Install Software
Install Software
```

5. On the next window, select the device that you are using for the installation. You can enter the drive name in the window or click on **List** to access the device list.

If you click on **List**, select the CD drive that you are using for the installation (for example, `/dev/cd0`).

6. Click on **OK**.
7. Locate the line **Software to Install**.
 - a. To install all components listed in step 8, continue at step 10 on page 23.
 - b. To selectively install components, click on **List** for the latest available software packages and continue at step 8.
8. Select the components that you need.

Required components are the storage agent and the message package to be used by the storage agent. The Tivoli Storage Manager device driver is only required when you are using a SCSI device that is not covered by an IBM SCSI device driver. To decide whether to install the device driver package, refer to the support Web site (noted in “Where to Look for Information” on page vi) for a list of devices supported by the Tivoli Storage Manager SCSI device driver.

Table 4. Package and Fileset Names for Installation on AIX 5.1 Platforms

Package and Fileset Names	Description
tivoli.tsm.StorageAgent.rte	Storage agent common functions, sample dsmsta.opt file

Table 4. Package and Fileset Names for Installation on AIX 5.1 Platforms (continued)

Package and Fileset Names	Description
tivoli.tsm.devices.aix5.rte64	SCSI runtime device support
tivoli.tsm.msg.xx_XX.devices	SMIT screens
tivoli.tsm.msg.xx_XX.server	Message catalog and Online help

Note that *xx_XX* represents the country code for the language contents of the package.

9. Click **OK**.
10. Check the default settings for the options on this window.
11. Click **OK**.

SMIT responds:

ARE YOU SURE?...

12. Click **OK**.
This installation may take several minutes.
13. Click **Done** after the installation is complete, remove the CD, and exit from SMIT.
14. Ensure that the DEVCONFIG option is specified in the dsmsta.opt file. For example, for a device configuration file named devconfig.out located at /usr/tivoli/tsm/StorageAgent/bin, edit the dsmsta.opt file and enter the following line:

```
DEVCONFIG devconfig.out
```

15. Use the information that you collected in step 1 on page 22 to issue the DSMSTA SETSTORAGESERVER command. For example:

```
dsmsta setstorageserver myname=storagnt mypassword=fun4me
myhladdress=agent.tucson.ibm.com
servername=tsmsrver serverpassword=not4u
hladdress=tsmsrver.tucson.ibm.com lladdress=1502
```

Note: The hladdress must match the TCPServeraddress located in the dsm.sys file on the Tivoli Storage Manager client.

See “Adding Communication Information for the Storage Agent” on page 44 for details about the command parameters.

The command generates the following lines in the device configuration file for the storage agent:

```
set staname storagnt
SET STAPASSWORD xxxxxxxx
SET STAHLADDRESS agent.tucson.ibm.com
DEFINE SERVER tsmsrver serverpassword=xxxxxxxxxxx
HLADDRESS=tsmsrver.tucson.ibm.com LLADDRESS=1502
```

The passwords (shown as xxxxxxxxxxxx) are encrypted in the file.

The command also generates the following line in the dsmsta.opt file:

SERVERNAME tsmsrver

See “The Storage Agent Options File” on page 46 and “The Device Configuration File for the Storage Agent” on page 49 for details about these files.

Step 2.2 IBM Tivoli Storage Manager Server: Defining the Storage Agent and Configuring Devices

This section provides the instructions that you need to perform on the Tivoli Storage Manager server. If further explanation is required, see the *Administrator's Guide*.

1. If you have not set up server-to-server communication on this server, you can do so now with the following commands:

```
set servername tsmsrver
set serverpassword not4u
set serverhladdress tsmsrver.tucson.ibm.com
set serverlladdress 1502
```

These commands establish the server's name, password, TCP/IP address, and port. Replace the example values with values from the server configuration information worksheet.

Note: The Server Password Set status in the QUERY STATUS output must be equal to YES. You set the server password by issuing the SET SERVERPASSWORD command from a Tivoli Storage Manager administrative command line. See the example above.

2. For each client that you want to enable SAN data transfer, define the client's storage agent to the Tivoli Storage Manager server as if the storage agent is a server. You must use the same name and password that you set for the storage agent when you installed it on the client system. The DEFINE SERVER command must be issued from the Tivoli Storage Manager server (library manager or library client) that will manage the client's data. For example:

```
define server storagnt serverpassword=fun4me
hladdress=agent.tucson.ibm.com lladdress=1500
```

If the library to be used for LAN-free data movement is a Tivoli Storage Manager shared library and the data manager server is a library client, then you must also define the storage agent to the library manager. It needs to be able to contact the library manager directly when making mount requests. If the storage agent is only defined to the library client, it will attempt to use information from the library client to define itself to the library manager. If the storage agent is unable to define itself to the library manager, the storage agent must be defined manually using the DEFINE SERVER command issued from the library manager. For example, from the library manager server, issue the following command to verify that the storage agent is defined to the library manager:

```
query server server_name format=detailed
```

If storage agent is not defined to the library manager, issue the DEFINE SERVER command. For example:

```
define server storagnt serverpassword=fun4me
hladdress=agent.tucson.ibm.com lladdress=1500
```

Note: In the event that the library manager is not the same server as the library client server that hosts the storage agent, you must define the storage agent as a server on both the library manager server and the library client server.

3. Configure the SAN drives. This involves the following steps:

Tape Device

When you are connecting the storage agent to the library manager, follow these steps:

- a. Define a shared ACSLS, SCSI, or 3494 library using the SHARED=YES option.
- b. Define paths to the library using the DEFINE PATH command on the server.
- c. Define drives that are associated with the library.
- d. Define paths to the drives using the DEFINE PATH command on the server.
- e. Define the device class.
- f. Define the storage pool.

When you are connecting the storage agent to the library client, complete Step a through Step e above on the library manager, and then complete the following steps on the library client:

- a. Define a shared ACSLS, SCSI, or 3494 library using a library type of shared (LIBTYPE=SHARED).
- b. Define the device class.
- c. Define the storage pool.

Disk Device

Configure server-to-server communication and define a device class of DEVTYPE=FILE and SHARED=YES. Tivoli Storage Manager automatically defines a new FILE library and also defines drives corresponding to the mount limit for the FILE device class. The FILE library name is the same as the device class name. Each drive uses the library name with a numeric suffix. If the mount limit is changed, the number of drives also changes.

Note: Because each session gets exclusive access to a file volume, the mount limit should correspond to the number of expected concurrent backups.

4. Define a copy group with its destination being the LAN-free capable storage pool (created in Step 3). For example:

```
define copygroup sandirect sandirectpolicy sandirectdefmft
type=backup destination=<storage pool name from Step 3>
```

Then activate the policy set. For example:

```
activate policyset sandirect sandirectpolicy
```

Notes:

- a. See the *Administrator's Guide* for details about changing policy for clients that can use SAN drives. For details about the commands, see the *Administrator's Reference*.
 - b. If you decide not to use the default management class for the SAN drives, you will need to create a new management class. Clients that want to use the SAN drives need to use an include statement to bind their files to this new management class. See the *Backup-Archive Clients Installation and User's Guide* for details about the include-exclude list.
 - c. Note that with a hierarchical storage management (HSM) client configured for LAN-free data movement, the management class (not the copy group) is set to a LAN-free capable storage pool.
5. If the node has already been registered and configured for LAN-free backups, issue the following command to confirm that the node settings are correct:

```
query node node_name format=detailed
```

You can issue the UPDATE NODE command to adjust settings for your node. If the node has not been registered and configured for LAN-free backups, register

the node with the REGISTER NODE command. For more information, see the REGISTER NODE and UPDATE NODE commands in the *Administrator's Reference*.

To help you tune the use of your LAN and SAN resources for LAN-free data movement, you can control the path that data transfers take for clients that have LAN-free data movement capability. For each client, you can select whether data read and write operations use:

- The LAN path only
- The LAN-free path only
- Either path

You can specify these settings with the REGISTER NODE and UPDATE NODE commands.

Be aware that if the node belongs to a multi-threaded client and there are drives available, the MAXNUMMP parameter may restrict the number of drives that are available for the storage agent to use on behalf of the client. The MAXNUMMP parameter is specified on the REGISTER NODE or UPDATE NODE command.

Step 3. Configuring Devices for the Storage Agent to Access

This section provides information to help you define paths from the storage agent to the drives that are available to the Tivoli Storage Manager server. Paths allow a client, by means of a storage agent, access to drives in a library. The requirements are different depending on the device you are using.

Consider the following guidelines before you begin defining paths to your SAN drives:

- You must have the names of your tape and drive devices. See "Obtain Device Information" on page 15 for details on how to obtain this information if you have not already done so.
- Paths from the storage agent to each drive that the storage agent will be allowed to access must be defined on the library manager. There must be a path defined from the library manager to each drive in order for the storage agent to use the drive.
- Review tape device names. For the same tape device, the device name as known to the server will probably not match the device name as known to the storage agent.

Figure 8 on page 27 shows the results of completing this step.

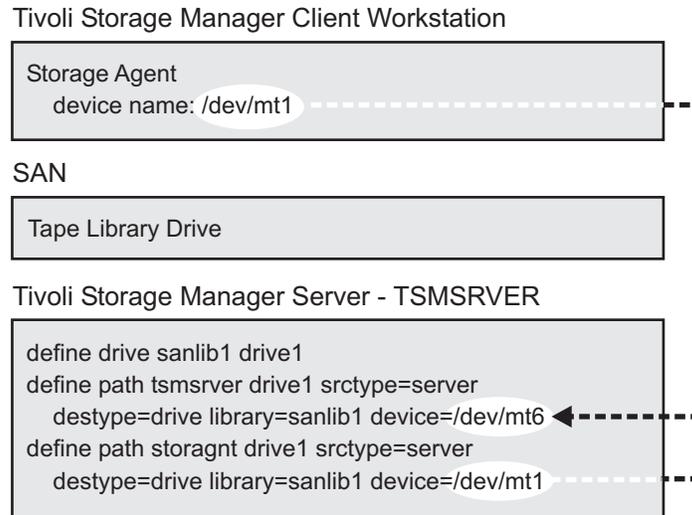


Figure 8. Device information

Tape Devices

Define paths on the server using the device names as seen by the storage agent on each client system.

Important: Be sure that the device names are what the storage agent sees on each client system.

Note: The DEFINE PATH command must be issued from the server designated as the library manager.

For example, you would issue the following:

```
define path storagnt drive1 srctype=server desttype=drive
  library=sanlib1 device=/dev/tmscsi/mt1
```

See the *Administrator's Reference* for your system platform for additional details on the DEFINE PATH command.

Depending on the operating system of the Tivoli Storage Manager server, there may not be a quick way to confirm which device names on the storage agent correspond to device names on the Tivoli Storage Manager server without using a trial and error method. To confirm device names, you should work with one online drive at a time, and cycle through the storage agent device names until a successful backup can be run. The server cannot validate PATH information that is provided on the server for use by the storage agent. Failures can occur if incorrect device information is provided in the DEFINE PATH command.

You can also specify the AUTODETECT=YES option when defining paths on the server. This allows the serial number for a drive or library to be automatically updated in the database when the path is defined. The updated serial number will be the same serial number that the drive reports to Tivoli Storage Manager. After a backup is completed in "Step 5.2 Verify the LAN-free Configuration" on page 29, you can issue the QUERY DRIVE command to obtain information that will help determine the device name from the storage agent.

For a review of the results of the steps that you have just completed, see Figure 8 on page 27.

Disk Devices

Define paths on the server using the device names as seen by the storage agent on each client system. For example, on the server side, the directory, `d:\tsmdata\server1`, is exported on the NFS server running on the Tivoli Storage Manager Server machine.

On the storage agent, the directory is NFS mounted as `/tsmdata/server1`. A path needs to be created for each file drive in the library. The following is the command issued to create the path for this scenario. In this example, `disklib1` represents the destination file drive in the disk library with a name of `disklib`.

```
define path storagnt disklib1 srctype=server desttype=drive library=disklib
device=file directory="/tsmdata/server1/fs1,/tsmdata/server1/fs2"
```

It is recommended that each directory correspond to a file system on a separate physical drive. The server cannot validate PATH information that is provided on the server for use by the storage agent. Failures can occur if incorrect device information is provided in the DEFINE PATH command.

Note that if you specified multiple directories for the device class associated with the FILE library, you must specify the same number of directories for each path to the FILE library. To keep the device class and path synchronized, do not change or move existing directories on the server that the storage agent is using. Adding directories is permitted. Specifying a mismatched number of directories can cause a run-time failure. See the "Defining Device Classes" chapter in the *Administrator's Guide* for more information.

For command information, see the *Administrator's Reference*.

Step 4. (z/OS only) Formatting Volumes for LAN-free Data Movement

When using the z/OS data manager server, volumes for sequential access storage pools that support LAN-free data movement require formatting before they can be used. LAN-free sessions will fail if the storage pool does not contain any formatted volumes and does not allow automatic formatting. For information about how to format volumes, refer to the *Administrator's Guide*.

Step 5. Starting the Storage Agent and Verifying the LAN-free Configuration

In this final step, you start the storage agent and verify the LAN-free configuration.

Step 5.1 Start the Storage Agent

After verifying that the server is online and running, start the storage agent by changing to the storage agent directory and issuing the following command:

```
dsmsta
```

When the storage agent starts, it contacts all available shared libraries, including those libraries that do not have a path defined. As a result, a delay may occur during startup processing. The storage agent also determines if the Tivoli Storage

Manager server is a library client or library manager. If the server is a library client, the storage agent attempts to define itself to the library manager if it is not known to the library manager.

Step 5.2 Verify the LAN-free Configuration

To verify that you have configured your system correctly for LAN-free data movement, perform the following procedure:

1. Specify the `DISPLAYLFINFO=YES` option in your server options file. This will allow the accounting records and summary table entries to report the storage agent name. Be aware that this option may cause existing outboard automation that relies on the summary table or accounting records not to recognize some activities for a given client. Make sure to consider how this may impact your environment before setting this option.
2. Issue the `VALIDATE LANFREE` command to determine which destinations for your node are capable of LAN-free data movement. For those nodes that are not capable of LAN-free data movement, this command provides an explanation as to why they are not capable. You can use this information to correct your configuration before proceeding to the next step.
3. Run a backup operation from the client.
4. Ensure the following if you receive a message saying that the backup has failed:
 - a. The Tivoli Storage Manager server is running. If the Tivoli Storage Manager server is not running, the storage agent will not start.
 - b. The client, storage agent, and server are communicating with each other as expected.
 - c. The paths to the drives are correctly defined.
 - d. All drives in a library have defined paths from the server.

Note: If you retry the backup operation after the first failure, the client attempts to use the LAN connection for data movement. The client will continue to use the LAN until the client is stopped and restarted.

Determining Whether the Data Movement was LAN-free

Use the following guidelines to help determine whether the data is moving on the LAN-free path:

- When the data transfers on a LAN-free path, a message displays informing you that the client is starting a session with the storage agent:

`ANR0415I Session session number proxied by storage agent name for node your node name`

This message confirms that LAN-free data movement has occurred.

- You can also view the backup report issued when backup processing completes. When LAN-free data movement has occurred, the number of "LAN-Free Bytes Transferred" is greater than zero.
- Monitor the `QUERY SESSION` output against the node that is running the LAN-free backup. Review the Bytes Sent and Bytes Received. You can perform this action by using a Tivoli Storage Manager administrative command-line client to login to the Tivoli Storage Manager server and storage agent to verify that the proper sessions have been established. When LAN-free data movement is occurring, a `QUERY SESSION` on the storage agent should show bytes received (displayed as Bytes Recvd) for the node increasing to the total amount of data being backed up. The `QUERY SESSION` on the Tivoli Storage Manager

server should show a very small number of bytes of metadata received for the same node. If the node's session exhibits this behavior, the data movement is LAN-free.

Note: During a failover where the storage agent is sending data directly to the server by proxy because it cannot store the data directly, the QUERY SESSION statistics on the server will show a much higher byte count.

- Issue either of the following QUERY ACTLOG commands on the server to which the client is connected:

```
query actlog search=storage_agent_name msgno=8337  
query actlog search=storage_agent_name
```

If the query finds entries in the activity log that relates to the storage agent, the client is using LAN-free data transfer.

Chapter 4. Installing and Configuring External Library Environments

Note: Before installing and configuring the storage agent, it is recommended that you read Chapter 2, "Planning," on page 5 and fill out the information forms in "Configuration Information Worksheets" on page 13.

This chapter describes installing and configuring the storage agent LAN-free function in environments that are using external library supports as defined in the *Administrator's Guide* in the appendix, "External Media Management Interface Description."

For high-level descriptions of this environment, see Chapter 1, "Storage Agent Overview," on page 1 and "Types of Environments" on page 5.

To install and configure the storage agent for LAN-free data movement:

1. Read the overview of the procedure.
2. Review the complete procedure which follows the summary.
3. Complete the steps described in the procedure.

The summary briefly describes the overall configuration. It is a good idea to understand the overall process before beginning the procedure because the process takes place on multiple machines at different times.

Overview of Installation and Configuration Tasks

The following summarizes the installation and configuration tasks provided in this chapter:

- **Step 1: Verifying network configuration**

Note: Ensure that your system meets the prerequisites for the SAN configuration.

- **Step 2: Establishing communications and configuring the client, storage agent, and Tivoli Storage Manager server**

- **Client System:**

- Install the Tivoli Storage Manager client or Tivoli Storage Manager data protection application client, and the Tivoli Storage Manager API. Specify the LAN-free option.
- Install and set up the storage agent.

- **Tivoli Storage Manager Server:**

- Configure the library and drives on the SAN.
- Define the storage agent as a server.

- **Step 3: Starting the storage agent and verifying the LAN-free configuration**

- Start the storage agent.
- Verify the LAN-free configuration.

If you will be using a storage agent with external library support, you must have an external library manager capable of exploiting the external library interface as defined in the *Administrator's Guide* in the appendix, "External Media Management

Interface Description.” See Figure 6 on page 11 for an example of a storage agent using a typical external library configuration.

Note: You can use the StorageTek LibraryStation to manage the environment instead of ACSLS. However, LibraryStation is required when you are using a z/OS data manager server.

Complete the following steps to configure your storage agent external library or shared ACSLS library manager environment.

Step 1. Verifying the Network Connection

The server system and the client systems must be attached to the SAN along with appropriate storage devices. The server system and the client systems must also be connected by means of a LAN.

The Tivoli Storage Manager for Storage Area Networks feature requires specific levels and models of hardware and software. Ensure that your system configuration meets the hardware and software requirements for the SAN setup. For more information go to www.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html.

Step 2. Establishing Communications and Configuring the Client, Storage Agent, and Tivoli Storage Manager Server

Figure 9 on page 33 shows the results of completing “Step 2.1 Client System: Installing Software” on page 33 and “Step 2.2 IBM Tivoli Storage Manager Server: Defining the Storage Agent and Configuring Devices” on page 37. Use this figure as a reference point as you work through the steps in this section.

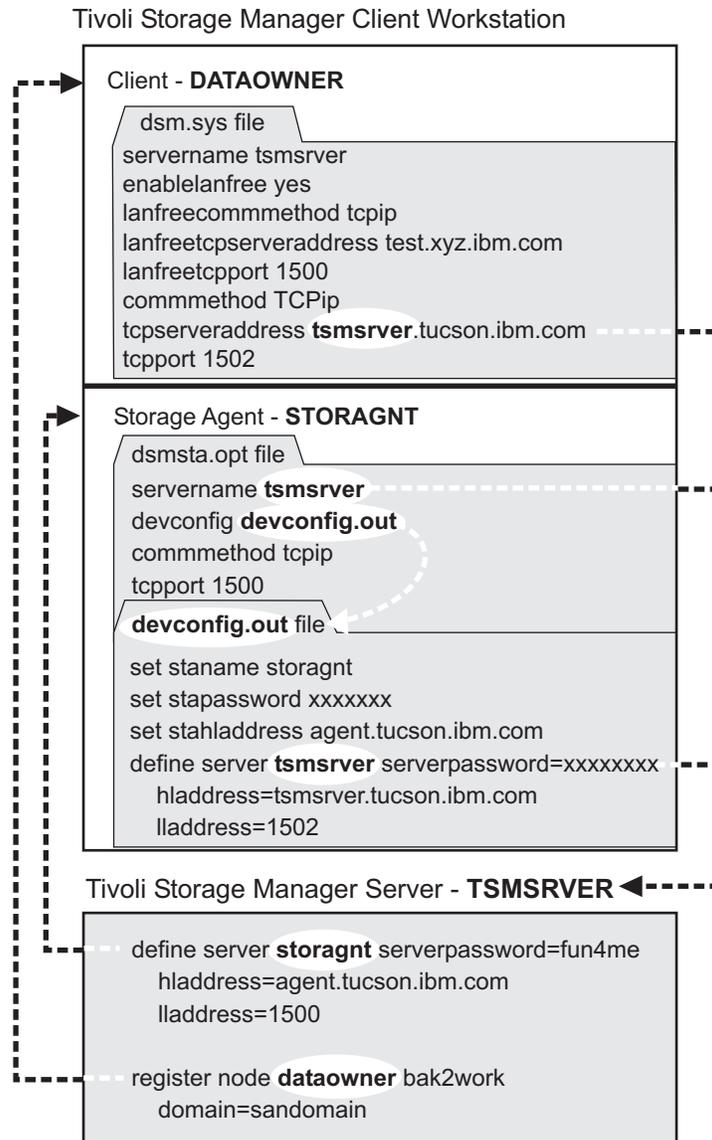


Figure 9. Communications information. Results of Steps 2.1 and 2.2. The passwords are shown as "xxxxxxx" because they are encrypted in the file.

Step 2.1 Client System: Installing Software

The procedures in this step describe installation and configuration of the Tivoli Storage Manager client, API, and storage agent.

Note: Gresham EDT or any other middleware that enables an external library is allowed. For installation information, see the Gresham or other middleware product documentation.

Install or Upgrade the Client and API Software

1. Check that the client system meets the prerequisites for client software. See the user's guide for the client. Install the client software and API if it is not already installed on the system, or upgrade the software to the latest level as necessary. The latest levels can be downloaded from the IBM Tivoli Storage Manager Web site at www.ibm.com/software/sysmgmt/products/

support/IBMTivoliStorageManager.html. If you are using the storage agent to support multiple clients, you must install or upgrade the client and API software on each client that will be supported.

2. Be sure you have the information recorded on the forms in “Configuration Information Worksheets” on page 13. This information is required in this procedure.
3. Modify the client options file (dsm.sys) For information about the dsm.opt and dsm.sys files, see the *Backup-Archive Clients Installation and User’s Guide*.
 - a. Locate the options file and open it. The file could be located in one of several places, such as the installation directory, or pointed to by an environment variable.
 - b. Specify the Tivoli Storage Manager server name. This information will come from the client system and server system configuration-information worksheets. For example:

```
servername tsmsrver
```

Keep the file open for the next step.

- c. Specify the communications method between the Tivoli Storage Manager client and server. Again, this information will come from the client system and server system configuration-information worksheets, as will the information for the next steps. For example:

```
COMMmethod TCPip  
TCPserveraddress tsmsrver.tucson.ibm.com  
TCPport 1502
```

Note: A TCPPORT of 1502 is used in the examples; however, the default TCPPORT is 1500.

Keep the file open for the next step.

- d. Edit the dsm.opt file to specify the server name of the dsm.sys stanza edited in step 3b. For example,
 - e. Add the following options to the same dsm.sys stanza edited in step 3b. These options specify that the client will use SAN-attached devices when the path is available, during backup, restore, archive, and retrieve processing.

```
enablelanfree yes  
LANFREECommmethod TCPIP  
LANFREETCPport 1500
```

or

```
LANFREECommmethod SharedMem  
LANFREESHMPORT 1510
```

4. If you are using a Tivoli Storage Manager data protection application client, configure the API by performing the following procedure:
 - a. Set up the environment variables. The Tivoli Storage Manager API uses unique environment variables to locate files.
 - DSMI_CONFIG is the fully qualified name for the client user option file.
 - DSMI_DIR points to the path containing dsm.sys, dsmtca, and the subdirectory en_US.
 - en_US subdirectory must contain dsmclientV3.cat.
 - DSMI_LOG points to the path for the dserror.log file

The following are examples on how to set up these environment variables.

```
export DSMI_CONFIG=/usr/tivoli/tsm/client/api/bin/dsm.opt
export DSMI_DIR=/usr/tivoli/tsm/client/api/bin
export DSMI_LOG=/home/user_a/logdir
```

Note: The quickest method to set the environment variables is to add these variables to the user's .profile file.

- b. Edit an existing stanza or create a new stanza in the dsm.sys file to specify the communications options between the Tivoli Storage Manager API and server. For example:

```
SERvername      tsmsrver
COMMmethod      TCPip
enablelanfree   yes
LANFREECommmethod TCPIP
LANFREETCPServeraddress test.xyz.company.com
LANFREETCPPort  1500
TCPport         1502
TCPserveraddress tsmsrver.tucson.ibm.com
```

Note: A TCPPORT of 1502 is used in the examples; however, the default TCPPORT is 1500.

If a dsm.sys file does not exist in the directory specified by DSMI_DIR, create a symbolic link to the dsm.sys file in the Tivoli Storage Manager client installation directory. For example:

```
ln -s /usr/tivoli/tsm/client/ba/bin/dsm.sys /usr/tivoli/tsm/client/api/bin/dsm.sys
```

Install and Configure the Storage Agent

Note: To reduce workload and processing time and to optimize LAN-free performance, do not install the storage agent and the Tivoli Storage Manager server on the same machine.

On the same system as the client, install the storage agent. The default installation directory is /usr/tivoli/tsm/StorageAgent/bin. The instructions in this section are shown using the Software Management and Installation Tool (SMIT). You can also use the Install and Update Software Manager (installm).

Note: Throughout this procedure, /dev/cd0 is used for CD-ROM. This may be different in your environment. Loading the storage agent files can take several minutes.

1. Be sure you have the information recorded on the forms in "Configuration Information Worksheets" on page 13. This information is required in this procedure.
2. Log in as the root user.
3. Load the storage agent CD into the selected drive.
4. From your desktop window, access SMIT and make selections according to the level of your AIX operating system.

Enter:

```
smit install_update &
```

Select:

```
Install Software
Install Software
```

5. On the next window, select the device that you are using for the installation. You can enter the drive name in the window or click on **List** to access the device list.
If you click on **List**, select the CD drive that you are using for the installation (for example, /dev/cd0).
6. Click on **OK**.
7. Locate the line **Software to Install**.
 - a. To install all components listed in step 8, continue at step 10.
 - b. To selectively install components, click on **List** for the latest available software packages and continue at step 8.
8. Select the components that you require.

Table 5. Package and Fileset Names for Installation. AIX 5.1 Platforms

Package Name	Fileset Names	Description
tivoli.tsm.StorageAgent.rte	tivoli.tsm.StorageAgent.rte	StorageAgent common functions, examples
tivoli.tsm.devices.aix5.rte64	tivoli.tsm.devices.aix5.rte64	SCSI runtime device support
tivoli.tsm.msg.xx_XX.devices	tivoli.tsm.msg.xx_XX.devices	SMIT screens
tivoli.tsm.msg.xx_XX.server	tivoli.tsm.msg.xx_XX.server	Message catalog and Online help

Note that *xx_XX* represents the country code for the language contents of the package.

9. Click **OK**.
10. Check the default settings for the options on this window.
11. Click **OK**.

SMIT responds:

ARE YOU SURE?...

12. Click **OK**.
This installation may take several minutes.
13. Click **Done** after the installation is complete, remove the CD, and exit from SMIT.
14. Use the information that you collected in step 1 on page 35 to issue the DSMSTA SETSTORAGESERVER command. For example:

```
dsmsta setstorageserver myname=storagnt mypassword=fun4me
myhladdress=agent.tucson.ibm.com
servername=tsmsrver serverpassword=not4u
hladdress=tsmsrver.tucson.ibm.com lladdress=1502
```

Note: The Tivoli Storage Manager server, in this example TSMSRVER, must be running when the DSMSTA SETSTORAGESERVER command is issued.

See “Adding Communication Information for the Storage Agent” on page 44 for details about the command parameters.

The command generates the following lines in the device configuration file for the storage agent:

```
SET STANAME storagnt
SET STAPASSWORD xxxxxxx
SET STAHLADDRESS agent.tucson.ibm.com
DEFINE SERVER tsmsrver serverpassword=not4u
HLADDRESS=tsmsrver.tucson.ibm.com LLADDRESS=1502
```

The passwords (shown here as xxxxxxxx) are encrypted in the file. Save the file to the same directory as the executable and close it.

The command also generates the following line in the `dsmsta.opt` file:

```
SERVERNAME tsmsrver
```

See “The Storage Agent Options File” on page 46 and “The Device Configuration File for the Storage Agent” on page 49 for details about these files.

Step 2.2 IBM Tivoli Storage Manager Server: Defining the Storage Agent and Configuring Devices

The following provides the instructions that you need to perform on the Tivoli Storage Manager server. If further explanation is required, see the *Administrator's Guide*.

1. If you have not set up Enterprise management (server-to-server communication) on this server, you can do so now with the following commands:

```
set servername tsmsrver
set serverpassword not4u
set serverhladdress tsmsrver.tucson.ibm.com
set serverlladdress 1502
set crossdefine on
```

These commands establish the server's name, password, and TCP/IP address and port, and allow other servers to define a connection on this server. Replace the example values with values from the server configuration information worksheet.

Note: The Server Password Set status in the QUERY STATUS output must be equal to YES. You set the server password by issuing the SET SERVERPASSWORD command from a Tivoli Storage Manager administrative command line. See the example above.

2. If you are using an ACSLS-managed external library, install Gresham EDT or other middleware that enables an external library. For installation information about Gresham EDT, see the Gresham documentation.
3. For each client that you want to enable SAN data transfer, define the client's storage agent to the Tivoli Storage Manager server as if the storage agent is a server. You must use the same name and password that you set for the storage agent when you installed it on the client system. The DEFINE SERVER command must be issued from the Tivoli Storage Manager server that will manage the client's data. For example:

```
define server storagnt serverpassword=fun4me
hladdress=agent.tucson.ibm.com lladdress=1500 validateprotocol=all
```

Note: The VALIDATEPROTOCOL parameter in the previous example is optional. This parameter determines whether a cyclic redundancy check should be performed to validate data on all metadata transferred between the storage agent and the Tivoli Storage Manager server. See the *Administrator's Reference* for additional information about the DEFINE SERVER command. See the *Administrator's Guide* for additional information about data validation.

The storage agent must also be defined to the library manager. It needs to be able to contact the library manager directly when making mount requests. If the storage agent is only defined to the client, it will attempt to use information

from the client to define itself to the library manager. If the storage agent is unable to define itself to the library manager, the storage agent must be defined manually using the DEFINE SERVER command issued from the library manager. For example:

```
define server storagt serverpassword=fun4me
hladdress=agent.tucson.ibm.com lladdress=1500
```

4. Configure a path to the library manager. If you need information about the commands, see the *Administrator's Reference*.

If you are using a shared ACSLS library manager, configure a path to the library manager. This involves the following steps:

- a. Define a library type of ACSLS. For example:

```
define library libmgr1 libtype=ACSL shared=YES
primarymanager=tsmsrvr
```

- b. Define a path from the server to the library manager. For example:

```
define path tsmsrver libmgr1 srctype=server desttype=library
```

- c. Define a device class with a device type of SERVER. For example:

```
define devclass adeviceclassname library=alibraryname
devtype=server servername=tsmsrvr
```

- d. Define the storage pool. For example:

```
define stgpool apoolname adeviceclassname pooltype=primary
```

If you are using an ACSLS-managed external library, configure a path to the external library manager. This involves the following steps:

- a. Define a library type of EXTERNAL. For example:

```
define library stk-lib libtype=external
```

Note that if a library name remains constant but the library type changes from EXTERNAL to shared ACSLS, the storage agent must be stopped and restarted in order to recognize this change.

- b. Define a path from the server to the external manager. Gresham EDT-DistribuTAPE is the external library manager interfacing with the ACSLS library software. The EDT executable is located in its default path /usr/lpp/dtelm/bin/elm. For example:

```
define path tsmsrver stk-lib srctype=server desttype=library
externalmanager=/usr/lpp/dtelm/bin/elm
```

In the previous example, the path provided for the external manager depends on the operating system where the Tivoli Storage Manager server resides. For example:

- A Linux Tivoli Storage Manager server external manager path is /usr/dtelm/bin/elm.
- A Sun Solaris Tivoli Storage Manager server external manager path is /opt/OMIdtelm/bin/elm.
- A Windows Tivoli Storage Manager server external manager path is c:\program files\GES\EDT\bin\elm.exe.

- c. Define a device class with a device type of ECARTRIDGE. For example:

```
define devclass adeviceclassname library=alibraryname
devtype=ecartridge format=drive
```

Note: When you are using StorageTek 9840B tape devices with the z/OS data manager server, the FORMAT attribute of the device class must match the device type of the tape drive (that is, 9840B).

- d. Define the storage pool. For example:

```
define stgpool apoolname adeviceclassname pooltype=primary
```

5. If you are using a shared ACSLS library manager, define a path from the storage agent to the library manager. For example:

```
define path storagnt libmgr1 srctype=server desttype=library
```

If you are using an ACSLS-managed external library, define a path from the storage agent to the external manager. Gresham EDT-DistribuTAPE is the external library manager interfacing with the ACSLS library software. The EDT executable is located in its default path `/usr/lpp/dtelm/bin/elm`. For example:

```
define path storagnt stk-lib srctype=server desttype=library
externalmanager=/usr/lpp/dtelm/bin/elm
```

For additional information about the `DEFINE LIBRARY` and `DEFINE PATH` commands, see the *Administrator's Reference*.

6. Define a copy group with its destination being the LAN-free capable storage pool (created in Step 4). For example:

```
define copygroup sandirect sandirectpolicy sandirectdefmft
type=backup destination=<storage pool name from Step 3>
```

Then activate the policy set. For example:

```
activate policyset sandirect sandirectpolicy
```

Notes:

- a. See the *Administrator's Guide* for details about changing policy for clients that can use SAN drives. For details about the commands, see the *Administrator's Reference*.
 - b. If you decide not to use the default management class for the SAN drives, you will need to create a new management class. Clients that want to use the SAN drives need to use an include statement to bind their files to this new management class. See the *Backup-Archive Clients Installation and User's Guide* for details about the include-exclude list.
 - c. Note that with a hierarchical storage management (HSM) client configured for LAN-free data movement, the management class (not the copy group) is set to a LAN-free capable storage pool.
7. If the node has already been registered and configured for LAN-free backups, issue the following command to confirm the node settings are correct:

```
query node node_name format=detailed
```

You can issue the `UPDATE NODE` command to adjust settings for your node. If the node has not been registered and configured for LAN-free backups, register the node with the `REGISTER NODE` command. For more information, see the `REGISTER NODE` and `UPDATE NODE` commands in the *Administrator's Reference*.

To help you tune the use of your LAN and SAN resources for LAN-free data movement, you can control the path that data transfers take for clients that have LAN-free data movement capability. For each client, you can select whether data read and write operations use:

- The LAN path only
- The LAN-free path only
- Either path

Be aware that if the node belongs to a multi-threaded client and there are drives available, the `MAXNUMMP` parameter may restrict the number of

drives that are available for the storage agent to use on behalf of the client. The MAXNUMMP parameter is specified on the REGISTER NODE or UPDATE NODE command.

Step 3. Starting the Storage Agent and Verifying the LAN-free Configuration

During this step you will start the storage agent and verify the LAN-free configuration.

Step 3.1 Start the Storage Agent

Start the storage agent by changing to the storage agent directory and issuing the following command:

```
dsmsta
```

Step 3.2 Verify the LAN-free Configuration

To verify that you have configured your system correctly for LAN-free data movement, perform the following procedure:

1. Run a backup operation from the client. Verify that the backup is LAN-free by using a Tivoli Storage Manager administrative command-line client to login to the Tivoli Storage Manager server and storage agent to verify that the proper sessions have been established. When LAN-free data movement is occurring, a QUERY SESSION on the storage agent should show bytes received (displayed as Bytes Recvd) for the node increasing to the total amount of data being backed up. The QUERY SESSION on the Tivoli Storage Manager server should show a very small amount of bytes received (metadata) for the same node. If the node's session exhibits this behavior, and you receive a message stating that the backup has been successful, you have configured your system correctly.

There are several ways to use the QUERY SESSION command. You can issue the command on the storage agent console if the process is running in the foreground. Or, you can use a command-line client to connect to the storage agent on the administration port of the storage agent. You would use the same administrator ID and password for this command as you would on the server.

2. Ensure the following if you receive a message saying that the backup has failed:
 - a. The Tivoli Storage Manager server is running. If the Tivoli Storage Manager server is not running, the storage agent will not start.
 - b. The client, storage agent, and server are communicating with each other as expected.
 - c. The mount and message is displayed on the storage agent console.

Notes:

1. If you retry the backup operation after the first failure, the client attempts to use the LAN connection for data movement. The client will continue to use the LAN until the client is stopped and restarted.
2. When using the z/OS data manager server, volumes for sequential access storage pools that support LAN-free data movement require formatting before they can be used. LAN-free sessions will fail if the storage pool does not contain any formatted volumes and does not allow automatic formatting. For details, refer to the *IBM Tivoli Storage Manager for z/OS Administrator's Guide* and *IBM Tivoli Storage Manager for z/OS Administrator's Reference*.

Determining Whether the Data Movement was LAN-free

Use the following guidelines to help determine whether the data is moving on the LAN-free path:

- Monitor the QUERY SESSION output against the node that is running the LAN-free backup. Review the bytes sent and bytes received. You can perform this action by using a Tivoli Storage Manager administrative command-line client to login to the Tivoli Storage Manager server and storage agent to verify that the proper sessions have been established. When LAN-free data movement is occurring, a QUERY SESSION on the storage agent should show bytes received (displayed as bytes recvd) for the node increasing to the total amount of data being backed up. The QUERY SESSION on the Tivoli Storage Manager server should show a very small number of bytes of metadata received for the same node. If the node's session exhibits this behavior, the data movement is LAN-free.

Note: During a failover where the storage agent is sending data directly to the server by proxy because it cannot store the data directly, the QUERY SESSION statistics on the server will show a much higher byte count.

- Issue either of the following QUERY ACTLOG commands on the server to which the client is connected:

```
query actlog search=storage_agent_name msgno=8337
query actlog search=storage_agent_name
```

If the query finds entries in the activity log that relate to the storage agent, the client is using LAN-free data transfer.

Appendix A. Administration and Configuration Reference

This section provides information about administering, monitoring, tuning, and connecting the storage agent.

Starting and Stopping the Storage Agent

The storage agent can be configured to start automatically upon system reboot. It can also be started and stopped manually. The following is a description of these tasks.

Automating the Storage Agent Startup

The storage agent is configured to start automatically at the time of installation. An entry is made to the **inittab** to enable automatic start up. The storage agent automatically restarts and runs in the background when the operating system is rebooted.

During the installation process, the `etc/inittab` is updated with the following command to enable automatic startup:

```
mkitab autostgagnt:2:once: "/usr/tivoli/tsm/StorageAgent/bin/rc.tsmstgagnt
>/dev/console 2>&1 #Start the Tivoli Storage Manager storage agent"
```

If you decide that you do not want the storage agent to start automatically, you can issue the following command to remove the statement from the `/etc/inittab`.

```
rmitab "autostgagnt"
```

Manually Starting and Stopping the Storage Agent

Start the storage agent by accessing the storage agent directory and issue the following command:

```
dsmsta
```

Stop the storage agent by typing the following command at the command line prompt:

```
halt
```

Note that you can also use an administrative client to issue commands supported by the storage agent.

In most cases it is not necessary to halt and restart a LAN-free storage agent to pick up changes from the data manager server. However, restarting the storage agent may be necessary if an attempt was made to change storage pool, library, device class, or drive information while LAN-free data movement was in process.

The effects on LAN-free storage pools resulting from such an attempted change are not critical enough to create serious problems. The storage agent keeps a list of storage pools, libraries, and device classes in memory to determine potential LAN-free destinations. Target volume selection occurs on the data manager server.

Certain storage pool attributes can result in failed requests rather than the desired LAN failover by the storage agent. If the storage agent accurately identifies a LAN-free destination, the LAN-free operation will most likely be successful.

However, if the storage agent inaccurately identifies a LAN-free destination and the server is unable to process the request, the operation has advanced past the point where LAN failover will occur and the storage agent request will be unsuccessful. If this occurs, halt and restart the storage agent and then retry the operation.

Adding Communication Information for the Storage Agent

The DSMSTA SETSTORAGESERVER utility initializes the storage agent and adds communication information to the device configuration file and the dsmsta.opt file. Use this utility on the client system where the storage agent has been installed. See “Install and Configure the Storage Agent” on page 21 for more information on when to use this command.

This utility does not remove any previous entries in the files. It appends information to the existing files. The option DEVCONFIG, which sets a name for the device configuration file, must be in the dsmsta.opt file for the command to work. See “Examples” on page 45 for details on the information that the command adds.

Format

```
▶▶—DSMSTA SETSTORAGESERVER—MYName—==—storage_agent_name—————▶▶
▶—MYPAssword—==—storage_agent_password—————▶
▶—MYHLAddress—==—storage_agent_hladdress—SERVERName—==—server_name—————▶
▶—SERVERPAssword—==—server_password—HLAddress—==—server_tcpip_address—————▶
▶—LLAddress—==—server_tcpip_port—————▶▶
```

Parameters

All parameters are required.

Note: Allowed abbreviations for the options are shown in uppercase letters.

MYName

Specifies the name of the storage agent. This name appears in the SET STANAME command that is inserted into the device configuration file.

Note: You must use the same name when you define the storage agent as a server to the Tivoli Storage Manager server.

MYPAssword

Specifies the password of the storage agent. This value is encrypted and used in the SET STAPASSWORD command that is inserted into the device configuration file.

Note: You must use the same password when you define the storage agent as a server to the Tivoli Storage Manager server.

MYHLAddress

Specifies the TCP/IP address of the storage agent. This value is used internally in the SET STAHLAddress command that is inserted into the device configuration file.

SERVERName

Specifies the name of the Tivoli Storage Manager server. This name appears in the DEFINE SERVER command that is inserted into the device configuration file.

SERVERPassword

Specifies the password of the server. This value is encrypted and appears in the SERVERPASSWORD field of the DEFINE SERVER command that is inserted into the device configuration file.

HLAddress

Specifies the TCP/IP address of the server. This value is used in the HLADDRESS field of the DEFINE SERVER command.

LLAddress

Specifies the TCP/IP port on which to access the server. This value is used in the LLADDRESS field of the DEFINE SERVER command.

Examples

Issue the DSMSTA SETSTORAGESERVER command with the following information:

- Storage agent
 - Name: storagnt
 - Password: fun4me
 - TCP/IP address: agent.tucson.ibm.com
- Tivoli Storage Manager server
 - Name: tsmsrver
 - Password: not4u
 - TCP/IP address: tsmsrver.tucson.ibm.com
 - TCP/IP port: 1502

The command is:

```
dsmsta setstorageserver myname=storagnt mypassword=fun4me
myhladdress=agent.tucson.ibm.com
servername=tsmsrver serverpassword=not4u
hladdress=tsmsrver.tucson.ibm.com lladdress=1502
```

The command generates the following lines in the device configuration file for the storage agent:

```
SET STANAME storagnt
SET STAPASSWORD xxxxxxxx
SET STAHLADDRESS agent.tucson.ibm.com
DEFINE SERVER tsmsrver serverpassword=xxxxxxx
HLADDRESS=tsmsrver.tucson.ibm.com LLADDRESS=1502
```

The passwords (shown as xxxxxxxx) are encrypted in the file.

The command also generates the following line in the dsmsta.opt file for the storage agent:

```
SERVERNAME tsmsrver
```

The Storage Agent Options File

The options file for the storage agent is named `dsmsta.opt`. The `dsmsta.opt` file for the storage agent contains the name of the server with which the storage agent communicates, along with other options. The `dsmsta.opt` file is located where the storage agent program was installed. The default path is: `/usr/tivoli/tsm/StorageAgent/bin`.

Normally, you do not need to make any changes to the options file unless your Tivoli Storage Manager server changes.

Detailed information about these options is available in the *Administrator's Reference*.

For detailed information on the `commethod` and `lanfreecommethood` options, see the *IBM Tivoli Storage Manager for UNIX and Linux: Backup-Archive Clients Installation and User's Guide*.

Required Options

This section describes the required options.

Note: Allowed abbreviations for the options are shown in uppercase letters.

DEVCONFig *file_name*

The name of the device configuration file for the storage agent. A typical name for the file is `devconfig`.

SERVERName *server_name*

The name of the Tivoli Storage Manager server with which the storage agent communicates. The `DSMSTA SETSTORAGESEVER` command inserts this option.

TCPPort *number*

Specifies the port number on which the server TCP/IP communication driver is to wait for requests for client sessions.

Using different port numbers for the options `TCPPORT` and `TCPADMINPORT` enables you to create one set of firewall rules for client sessions and another set for other session types (administrative sessions, server-to-server sessions, SNMP subagent sessions, storage agent sessions, library client sessions, managed server sessions, and event server sessions). If the two port numbers are different, separate threads will be used to service client sessions and the other session types. If you allow the two options to use the same port number (by default or by explicitly setting them to the same port number), a single server thread will be used to service all session requests.

Additional Options

The following options are also available, but not required:

ADMINONClientport *yes | no*

Specifies whether or not the `TCPPORT` can be used by administrative sessions. You can specify one of the following values:

- **YES** (default)

If the option is set to YES, or if the TCPSPORT and TCPADMINPORT are the same value (the default), then the administrative sessions can use the TCPSPORT.

- **NO**

If the option is set to NO, and if the TCPADMINPORT value is different than the TCPSPORT value, then administrative sessions cannot use TCPSPORT.

COMMTIMEOUT *seconds*

Specifies the maximum number of seconds that the server waits for an expected client message during an operation that causes a database update. The default value is 60. The minimum value is 1. If the length of time exceeds this time-out, the server ends the session with the client. You may want to increase the time-out value to prevent clients from timing out. Clients may time out if there is a heavy network load in your environment or when they are backing up large files.

IDLETIMEOUT *minutes*

Specifies the maximum number of minutes that a client session can be idle before the server cancels the session. The default value is 15 minutes. The minimum value is 1 minute. You may want to increase the time-out value to prevent clients from timing out if there is a heavy network load in your environment. Note, however, that a large number of idle sessions could prevent other users from connecting to the server.

MAXSESSIONS *number_of_sessions*

Specifies the maximum number of simultaneous client sessions that can connect with the server. The default value is 25 client sessions. The minimum value is 2 client sessions. The maximum value is limited only by available virtual memory size or communication resources.

MSGSTACKTRACE *on|off*

Specifies that a list of functions will be shown on the server console, and will also be directed to the activity log after specific messages have been issued. The output will help the Tivoli Storage Manager service team to diagnose specific problems quicker. It is recommended that this option be set to ON.

RESOURCE_TIMEOUT *minutes*

Specifies the maximum number of minutes that a storage agent waits for a resource on the server. The default value is 60 minutes. The minimum value is 1 minute.

For database resources and sessions on the storage agent, the Tivoli Storage Manager resource monitor picks the shortest time-out value to start a recovery process.

In contrast, in the case of library sharing, the resource monitor picks the longest time for both the library manager and library client to recover. For more efficient management of shared library resources, consider setting resource time-outs at the same limit for all participants in a shared configuration. In any case of error recovery, Tivoli Storage Manager always defers to the longest timeout limit.

You should also specify this option in the server options file. The server uses this option to monitor some of the storage agent sessions and resources and will cancel sessions based on the value you specify.

SANDISCOVERY

Specifies whether the Tivoli Storage Manager SAN discovery function is enabled. When set to ON, the storage agent will perform SAN discovery in the following instances:

- During storage agent initialization
- When the device path has been changed and there is a conflict between the device serial number and the device path provided by the server

Using SAN discovery, the storage agent can automatically correct the device's special file name if it has been changed. If the HBA used by the storage agent does not support SAN device mapping, you should set the SANDISCOVERY option to OFF.

For information about Tivoli Storage Manager supported HBAs for SAN device mapping, see www.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html

The storage agent does not require persistent binding with the SAN discovery function enabled.

STAMaxpooledsessions *number*

Specifies the number of individual sessions that are allowed to start and stop between the storage agent and the Tivoli Storage Manager server. The range of values is 0 - 150, with a default of 25. Each session is governed by the IDLETIMEOUT option and is stopped when the timeout value is exceeded. If the storage agent needs more sessions than specified, additional sessions are allowed. Although the default value is typically sufficient, setting this option with a low number can adversely affect performance. Be aware that if the storage agent has multiple client sessions, increasing the value of this option will help support these sessions.

TCPADMINPORT *number*

Specifies the port number on which the server TCP/IP communication driver is to wait for requests for sessions other than client sessions. This includes administrative sessions, server-to-server sessions, SNMP subagent sessions, storage agent sessions, library client sessions, managed server sessions, and event server sessions. The default is the value of TCPSPORT.

Using different port numbers for the options TCPSPORT and TCPADMINPORT enables you to create one set of firewall rules for client sessions and another set for the other session types listed above. By using the SESSIONINITIATION parameter of REGISTER and UPDATE NODE, you can close the port specified by TCPSPORT at the firewall, and specify nodes whose scheduled sessions will be started from the server. If the two port numbers are different, separate threads will be used to service client sessions and the session types. If you allow the two options to use the same port number (by default or by explicitly setting them to the same port number), a single server thread will be used to service all session requests. Client sessions which attempt to use the port specified by TCPADMINPORT will be terminated (if TCPSPORT and TCPADMINPORT specify different ports). Administrative sessions are allowed on either port, (unless the ADMINONCLIENTPORT option is set to NO) but by default will use the port specified by TCPADMINPORT.

THROUGHPUTDatathreshold *kilobytes_per_second*

Specifies the throughput that client sessions must achieve to prevent cancellation after THROUGHPUTTimethreshold *minutes* have elapsed. The

default value of 0 prevents examining client sessions for insufficient throughput. Throughput is computed by adding send and receive byte counts and dividing by the length of the session. The length does not include time spent waiting for media mounts and starts at the time a client sends data to the server for storage. The minimum value is 0; the maximum is 99999999.

THROUGHPUTTimethreshold *minutes*

Specifies the threshold for examining client sessions and cancelling them if the data throughput threshold is not met (see THROUGHPUTDatathreshold). This threshold does not include time spent waiting for media mounts. The time threshold starts when a client begins sending data to the server for storage (as opposed to setup or session housekeeping data). The default value of 200 prevents examining client sessions for low throughput. The minimum value is 0; the maximum is 99999999.

USELARGEBUFFERS *yes | no*

Specifies that large buffers are used for client-server communications. The default of *yes* specifies that large buffers are used; *no* specifies that they are not used.

The Device Configuration File for the Storage Agent

The device configuration file for the storage agent includes information on the storage agent and information about the Tivoli Storage Manager server with which the storage agent communicates. The file is typically named `devconfig` and resides with the storage agent program at this location: `/usr/tivoli/tsm/StorageAgent/bin`. The `DSMSTA SETSTORAGESERVER` command normally generates the contents of the file, and you can also use the command to add information to the file.

Typical contents of the device configuration file are as follows:

```
SET STANAME storagnt
SET STAPASSWORD fun4me
SET STAHLADDRESS agent.tucson.ibm.com
DEFINE SERVER tsmsrver serverpassword=not4u
HLADDRESS=tsmsrver.tucson.ibm.com LLADDRESS=1502
```

In this example, `storagnt` is the name of the storage agent and `tsmsrver` is the name of the Tivoli Storage Manager server.

The following describes the contents of the file:

SET STANAME

Sets the name of the storage agent. The name must be the same as the name that was used to define the storage agent as a server to the Tivoli Storage Manager server.

SET STAPASSWORD

Sets the password of the storage agent. The password must be the same as the password that was used when defining the storage agent as a server to the Tivoli Storage Manager server. The password is encrypted.

SET STAHLADDRESS

Sets the TCP/IP address of the storage agent.

DEFINE SERVER

Define the Tivoli Storage Manager server with which the storage agent communicates.

Appendix B. Legacy ACSLS Data Migration and Coexistence

Note: For the latest information concerning migration and coexistence, see the Tivoli Storage Manager README.

If your environment consists of Tivoli Storage Manager storage pools associated with an ACSLS library type and an ECARTRIDGE device type, the library can be updated with the SHARED=YES option to enable LAN-free data movement.

If your environment consists of Tivoli Storage Manager storage pools associated with an ACSLS library type and a GENERICTAPE device type, data migration is required rather than coexistence because Tivoli Storage Manager ACSLS shared library support cannot co-exist with external library support. See the "Configuring Storage Devices" chapter in the *Administrator's Guide* for detailed information on how to migrate from an external library environment to a shared ACSLS library environment.

Data Migration

Data migration of ACSLS to external library support is necessary only when Tivoli Storage Manager ACSLS shared library support is not possible in your configuration. The only situation where ACSLS shared library support is not possible is when your environment does not contain a Tivoli Storage Manager server installed on AIX, Solaris, or Windows to serve as the library manager. Migrate the existing data from existing (old) storage pools to new storage pools associated with the appropriate policy, device class, and library definitions. Migration of data also allows the entire environment to be LAN-free, providing better performance and better utilization of tape drives and media.

Figure 10 on page 52 displays the normal migration path from an old storage pool containing the data associated with the ACSLS library type to a new storage pool associated with an EXTERNAL library type and an ECARTRIDGE device class.

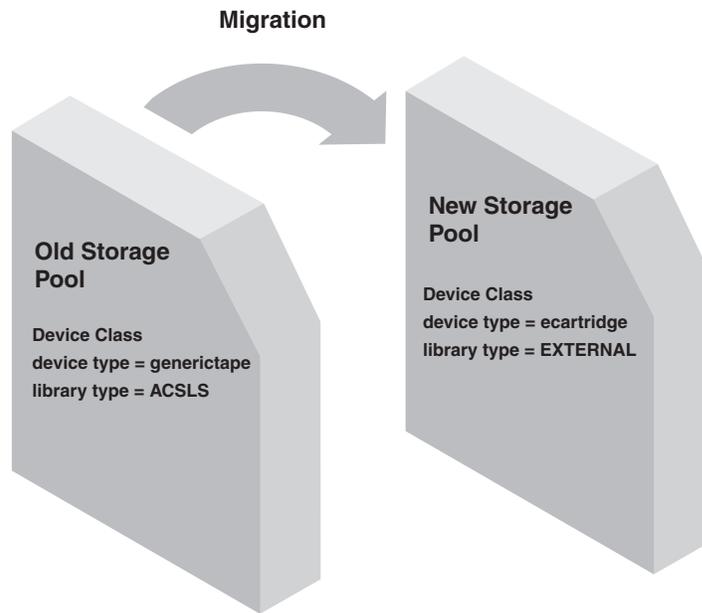


Figure 10. Legacy ACSLS Data Migration

Two methods to migrate data are:

- Use the IBM Tivoli Storage Manager server MOVE DATA command. This method allows the legacy ACSLS data to move to a new storage pool without moving any expired files in the aggregates. For more information, see the Managing Storage Pools and Volumes section of the *Administrator's Guide*.
- Use the IBM Tivoli Storage Manager server storage pool reclamation function. This method works by reclaiming the active files from the legacy ACSLS storage pools. Reclamation processing, however, is very resource intensive and should be performed during periods of little activity on the server. For more information, see Reclaiming Space in Sequential Access Storage Pools section of the *Administrator's Guide*.

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Glossary

The terms in this glossary are defined as they pertain to the IBM Tivoli Storage Manager library. If you do not find the term you need, refer to the IBM Software Glossary at www.ibm.com/ibm/terminology/. For a complete IBM Tivoli Storage Manager glossary, see the *Administrator's Guide*.

This glossary may include terms and definitions from:

- The *American National Standard Dictionary for Information Systems*, ANSI X3.172-1990, copyright (ANSI). Copies may be purchased from the American National Standards Institute, 11 West 42nd Street, New York 10036.
- 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 JTC2/SC1).

A

ACSLs. Automated Cartridge System Library Software.

application program interface (API). A set of functions that applications running on a client platform can call to store, query, and retrieve objects from Tivoli Storage Manager storage.

application client. One of the IBM Tivoli Storage Manager data protection programs installed on a system to protect an application. The IBM Tivoli Storage Manager server provides backup services to an application client.

archive. To copy one or more files to a storage pool for long-term storage. Archived files can include descriptive information and can be retrieved by archive date, by file name, or by description. Contrast with *retrieve*.

Automated Cartridge System Library Software (ACSLs). A library-enablement application from StorageTek. ACSLS functions as the central service provider for library operations.

automatic detection. A Tivoli Storage Manager feature that detects, reports, and updates the serial number of a drive or library in the database when the path from the local Tivoli Storage Manager server is defined.

B

back up. To copy information to another location to ensure against loss of data. In IBM Tivoli Storage Manager, you can back up user files, the IBM Tivoli Storage Manager database, and storage pools. Contrast with *restore*.

backup-archive client. A program that runs on a workstation or file server and provides a means for users to back up, archive, restore, and retrieve files.

C

client. A program running on a PC, workstation, file server, LAN server, or mainframe that requests services of another program, called the server. The following types of clients can obtain services from an IBM Tivoli Storage Manager server: administrative client, application client, API client, backup-archive client, and HSM client (also known as space manager client).

client node. A file server or workstation on which the backup-archive client program has been installed, and which has been registered to the server.

client options file. A file that a client can change, containing a set of processing options that identify the server, communication method, and options for backup, archive, hierarchical storage management, and scheduling. Also referred to as the *dsm.opt* file.

copy group. A policy object whose attributes control how backup versions or archive copies are generated, where backup versions or archive copies are initially located, and when backup versions or archive copies expire. A copy group belongs to a management class.

D

data manager server. A Tivoli Storage Manager server that collects metadata information for client inventory and manages transactions for the storage agent over the LAN. The data manager server informs the storage agent with applicable library attributes and the target volume identifier.

device class. A named set of characteristics applied to a group of storage devices. Each device class has a unique name and represents a device type of disk, file, optical disk, or tape.

device configuration file. (1) On an IBM Tivoli Storage Manager storage agent, a file that contains the name and password of the storage agent, and the DEFINE SERVER command for the IBM Tivoli Storage Manager server that is managing the SAN-attached libraries and drives. (2) On an IBM Tivoli Storage Manager server, a file that contains information about defined device classes, and, on some IBM Tivoli Storage Manager servers, defined libraries and drives.

device driver. A collection of subroutines that control the interface between I/O device adapters and the processor.

domain. A grouping of client nodes with one or more policy sets, which manage data or storage resources for the client nodes.

dsm.opt file. See *client options file*.

dsmserv.opt. See *server options file*.

dsmsta.opt. See *storage agent options file*.

E

external library. A type of library provided by IBM Tivoli Storage Manager to allow LAN-free data movement for ACSLS-managed StorageTek libraries. To activate this support, the IBM Tivoli Storage Manager library type must be EXTERNAL.

F

FILE device type. A device type that specifies the use of sequential access files on disk storage as volumes.

L

LAN-free data movement. The direct movement of client data between a client machine and a storage device on a SAN, rather than on the LAN.

library. (1) A repository for demountable recorded media, such as magnetic tapes. (2) For IBM Tivoli Storage Manager, a collection of one or more drives, and possibly robotic devices (depending on the library type), which can be used to access storage volumes.

library client. An IBM Tivoli Storage Manager server that uses server-to-server communication access to a library that is managed by another IBM Tivoli Storage Manager server.

library manager. An IBM Tivoli Storage Manager server that controls device operations when multiple

IBM Tivoli Storage Manager servers share a storage device. The device operations include mount, dismount, volume ownership, and library inventory.

M

management class. A policy object that users can bind to each file to specify how the server manages the file. The management class can contain a backup copy group, an archive copy group, and space management attributes. The copy groups determine how the server manages backup versions or archive copies of the file. The space management attributes determine whether the file is eligible to be migrated by the space manager client to server storage, and under what conditions the file is migrated.

N

node. A workstation or file server that is registered with an IBM Tivoli Storage Manager server to receive its services. See *client node*.

P

policy domain. A grouping of policy users with one or more policy sets, which manage data or storage resources for the users. In IBM Tivoli Storage Manager, the users are client nodes. See *policy set* and *management class*.

policy set. A policy object that contains a group of management classes that exist for a policy domain. Several policy sets can exist within a policy domain, but only one policy set is active at one time. See *policy domain* and *management class*.

R

reclamation. A process of consolidating the remaining data from many sequential access volumes onto fewer new sequential access volumes.

restore. To copy information from its backup location to the active storage location for use. In IBM Tivoli Storage Manager, you can restore the server database, storage pools, storage pool volumes, and users' backed-up files. The backup version of a file in the storage pool is not affected by the restore operation. Contrast with *backup*.

S

server. The program that provides backup, archive, space management, and administrative services to clients. The server program must be at the necessary level to provide all of these services.

server options file. A file that contains settings that control various server operations. These settings, or options, affect such things as communications, devices, and performance.

server storage. The primary and copy storage pools used by the server to store users' files: backup versions, archive copies, and files migrated from Tivoli Storage Manager for Space Management client nodes (space-managed files). See *storage pool* and *storage hierarchy*.

shared library. A library device that is shared among multiple IBM Tivoli Storage Manager servers.

storage agent. A program that enables IBM Tivoli Storage Manager to back up and restore client data directly to and from SAN-attached storage.

storage agent options file. A file that specifies options for the storage agent. This includes the name of the IBM Tivoli Storage Manager server with which the storage agent communicates, the number of sessions that can be kept open to the server, and the name of the device configuration file. Also called the *dsmsta.opt* file.

storage hierarchy. A logical ordering of primary storage pools, as defined by an administrator. The ordering is usually based on the speed and capacity of the devices that the storage pools use. In IBM Tivoli Storage Manager, the storage hierarchy is defined by identifying the *next* storage pool in a storage pool definition. See *storage pool*.

storage pool. A named set of storage volumes that is the destination that the IBM Tivoli Storage Manager server uses to store client data. A storage pool stores backup versions, archive copies, and files that are migrated from space manager client nodes. You back up a primary storage pool to a copy storage pool.

T

tape library. A term used to refer to a collection of drives and tape cartridges. The tape library can be an automated device that performs tape cartridge mounts and demounts without operator intervention.

V

volume. The basic unit of storage for the IBM Tivoli Storage Manager database, recovery log, and storage pools. A volume can be an LVM logical volume, a standard file system file, a tape cartridge, or an optical cartridge. Each volume is identified by a unique volume identifier.

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