

Version 6.1.0.0



Storage Manager FastBack for Bare Machine Recovery User's Guide



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Note

Before using this information and the product it supports, read the information in “Notices” on page 25.

This edition applies to version 6, release 1, modification 0 of IBM Tivoli Storage Manager FastBack for Bare Machine Recovery (product number 5724-U95) and to all subsequent releases and modifications until otherwise indicated in new editions.

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Preface

This publication documents how to use and troubleshoot IBM® Tivoli® Storage Manager FastBack™ for Bare Machine Recovery Version 6.1.0.0.

Who should read this guide

This publication is intended for a system administrator using Tivoli Storage Manager FastBack for Bare Machine Recovery following a disaster or catastrophic server failure.

Publications

Tivoli Storage Manager FastBack for Bare Machine Recovery publications and other related publications are available online.

You can search publications in the Tivoli Storage Manager FastBack for Bare Machine Recovery Information Center: <http://publib.boulder.ibm.com/infocenter/tsmfbinf/v6/index.jsp>

You can download PDF versions of publications from the Tivoli Storage Manager FastBack Information Center or from the IBM Publications Center at <http://www.ibm.com/shop/publications/order/>.

Support information

You can get support information for IBM products from a variety of sources.

Getting technical training

Information about Tivoli technical training courses is available online.

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

Searching knowledge bases

If you have a problem with Tivoli Storage Manager FastBack for Bare Machine Recovery, there are several knowledge bases that you can search.

You can begin with the Tivoli Storage Manager FastBack for Bare Machine Recovery Information Center at the following Web site: <http://publib.boulder.ibm.com/infocenter/tsmfbinf/v6/index.jsp>. From this Web site, you can search all Tivoli Storage Manager publications.

Searching the Internet

If you cannot find an answer to your question in the Tivoli Storage Manager information center, search the Internet for the latest, most complete information that might help you resolve your problem.

To search multiple Internet resources, go to the support Web site for Tivoli Storage Manager FastBack for Bare Machine Recovery at <http://www.ibm.com/software/tivoli/support/storage-mgr-fastback-bmr/>. From there, you can search a variety of resources including:

- IBM technotes
- IBM downloads
- IBM Redbooks®

If you still cannot find the solution to the problem, you can search forums and newsgroups on the Internet for the latest information that might help you resolve your problem. To share your experiences and learn from others in the user community, go to the Tivoli Storage Manager wiki at <http://www.ibm.com/developerworks/wikis/display/tivolistoragemanager/Home>.

Finding product fixes

A product fix to resolve your problem might be available from the IBM Software Support Web site.

You can determine what fixes are available by checking the Web site:

1. Go to the Tivoli Storage Manager FastBack for Bare Machine Recovery Support Web site at <http://www.ibm.com/software/tivoli/support/storage-mgr-fastback-bmr/>.
2. Click the **Download**.
3. Click **Fixes by version**.

Getting e-mail notifications of product fixes

You can get notifications about fixes and other news about IBM products.

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 notifications** 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 now** to establish your user ID and password.
3. Sign in to **My notifications**.
4. On the My notifications page, click **Subscribe**.
5. Select a product family and check the appropriate boxes for the type of information you want.
6. Click **Submit**.

Contacting IBM Software Support

You can contact IBM Software Support if you have an active IBM software maintenance contract and if you are authorized to submit problems to IBM.

Before you contact IBM Software support, follow these steps:

1. "Setting up a software maintenance contract"
2. "Determine the business impact" on page vii
3. "Describe problems and gather background information" on page vii

Then see "Submit the problem to IBM Software Support" on page viii for information on contacting IBM Software Support.

Setting up a software maintenance contract

Set up a software maintenance contract. The type of 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 IBM DB2® and IBM WebSphere® products that run on Windows® or UNIX® operating systems), enroll in IBM Passport Advantage® in one of the following ways:
 - **Online:** Go to the Passport Advantage Web page at <http://www.ibm.com/software/lotus/passportadvantage/>, and click **How to enroll**, and follow the instructions.
 - **By phone:** For the phone number to call in your country, go to the IBM Software Support Handbook Web page at <http://www14.software.ibm.com/webapp/set2/sas/f/handbook/home.html> and click **Contacts**.
- For server software products, 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 server software products, go to the IBM Technical support advantage Web page at <http://www.ibm.com/servers/>.

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. For a list of telephone numbers of people who provide support for your location, go to the Software Support Handbook page at <http://www14.software.ibm.com/webapp/set2/sas/f/handbook/home.html>.

Determine the business impact

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

Severity 1

The problem has a *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

The problem has a *significant* business impact. The program is usable, but it is severely limited.

Severity 3

The problem has *some* business impact. The program is usable, but less significant features (not critical to operations) are unavailable.

Severity 4

The problem has *minimal* business impact. The problem causes little impact on operations, or a reasonable circumvention to the problem was implemented.

Describe problems and gather background information

When explaining a problem to IBM, it is helpful to 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:

- Which 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 recreated? 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 the problem? If so, be prepared to explain the workaround when you report the problem.

Submit the problem to IBM Software Support

You can submit your problem to IBM Software Support online or by phone.

Online

Click **Submit and track problems** on the IBM Software Support site at <http://www.ibm.com/software/support/probsub.html>. Type your information into the appropriate problem submission form.

By phone

For the phone number to call in your country, go to the contacts page of the *IBM Software Support Handbook* at <http://techsupport.services.ibm.com/guides/contacts.html>.

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. If a workaround is possible, IBM Software Support provides a workaround that you can implement until the APAR is resolved and a fix is delivered. IBM publishes resolved APARs on the Software Support Web site at <http://www.ibm.com/software/tivoli/support/storage-mgr-fastback-bmr/>, so that other users who experience the same problem can benefit from the same resolution.

Conventions used in this information

This information uses the Microsoft Windows convention for specifying environment variables and for directory notation.

Documentation changes

Documentation changes were made in support of the information center refresh for IBM Tivoli Storage Manager FastBack for Bare Machine Recovery, Version 6.1.0.0. Updates based on changes made to the software to fix defects and to respond to problem reports.

Chapter 1. Overview

Tivoli Storage Manager FastBack for Bare Machine Recovery is part of the Tivoli Storage Manager FastBack product family.

Tivoli Storage Manager FastBack for Bare Machine Recovery is a solution for Windows operating systems that you can use to recover entire systems to a comparable server, to a new server with different hardware, or to a virtual machine. You can also use Tivoli Storage Manager FastBack for Bare Machine Recovery to migrate a server.

Tivoli Storage Manager FastBack supports Tivoli Storage Manager FastBack for Bare Machine Recovery on both 32 and 64-bit operating systems and processors.

A bare machine recovery has the following advantages:

- Reduce the amount of time it takes for you to get to the point where you start restoring data.
- Automates some of the steps, for example, re-partitioning your hard drives.

One way to reduce the amount of downtime after a system failure is to avoid installing the operating system on your hard drive. Tivoli Storage Manager FastBack for Bare Machine Recovery helps you to restore your operating system by booting an operating system from a CD into the computer memory, as opposed to booting the operating system from a hard disk. Booting the operating system from a hard disk is not feasible because you are recovering a system. When you run Tivoli Storage Manager FastBack for Bare Machine Recovery, a boot CD, referred to in this document as the FastBack for Bare Machine Recovery CD, is required.

Cloned disks for deployment can also be created. In this case, some manual changes in the system names and, perhaps, Active Directory definitions might be required.

The following situations require the use of Tivoli Storage Manager FastBack for Bare Machine Recovery:

- Recovery from a corrupted operating system.
- Recovery from failed system hardware.
- Restoring a disk to the same or a different disk on the same computer due to disk failure.
- Creating clone disks (including the operating system) for deployment.
- Restoring the operating system and environment due to wrong installations or patches (for example, restore to the same disk and same boot volume).

In a cluster environment, when running bare machine recovery, direct bare machine recovery to a clustered disk, including a quorum disk, is not supported. However, you can remove the disk from the cluster before starting a bare machine recovery. After bare machine recovery is complete, you can return the disk to the cluster.

Supported environments

Before using Tivoli Storage Manager FastBack for Bare Machine Recovery, make sure you meet the processor and operating system requirements.

Tivoli Storage Manager FastBack for Bare Machine Recovery supports the following environments:

- x86 processors (32 bit) with Microsoft Windows 32-bit operating systems
- x64 (AMD64 and EM64T) processors with Microsoft Windows 32-bit or 64-bit operating systems
- UEFI platform machines (IA64 - Intel® Itanium® processors, or X86 processors)

Support for virtual machines and virtualization

When you run Tivoli Storage Manager FastBack software on virtual machines and through virtualization, the guest system must run an operating system supported by the Tivoli Storage Manager FastBack component. For example, the guest system where the FastBack Server is installed must run one of the supported operating systems for FastBack Server.

The following list summarizes support for virtual machines and virtualization:

VMware ESX guest

Tivoli Storage Manager FastBack products and components are supported for backup and recovery within the VMware ESX virtual guest.

Microsoft Hyper-V virtual guest

Tivoli Storage Manager FastBack products and components are supported for backup and recovery within the Microsoft Hyper-V virtual guest. Backups of the Hyper-V virtual machines from the parent partition using Microsoft's Volume Shadow Copy Services (VSS) is not supported.

If you complete a bare machine recovery to a Hyper-V virtual machine, use the following list of tips:

- The target virtual machine for the bare machine recovery must have a legacy network adapter. You can add a legacy network adapter to the virtual machine by going to the Hyper-V Manager, clicking **Settings** for the virtual machine, and then clicking **Add Hardware** → **Legacy Network Adapter**.
- To have the mouse available on the Hyper-V virtual machine, install *Hyper-V Manager*. Hyper-V Manager requires the Microsoft® Windows Vista, Service Pack 1 or Microsoft Windows Server 2008.
- The boot partition must be located on a virtual IDE disk. Hyper-V cannot boot from a SCSI disk.

x86 processors (32-bit) with Windows 32-bit operating systems

The following list describes what you need in order to complete the disk restore processing using Tivoli Storage Manager FastBack for Bare Machine Recovery:

- The user credentials entered for disk restoration must have privileges for Tivoli Storage Manager FastBack for Bare Machine Recovery on the volumes and disks to be restored.
- The FastBack for Bare Machine Recovery CD requires a minimum of 512 MB of RAM.

- The capacity of the destination disk must support the restore process operation. You need the same size or larger. If additional space is available after the restore process, it can be configured manually for use after the restore process.
- After a successful Tivoli Storage Manager FastBack for Bare Machine Recovery of a system disk, Windows can require product activation. For Windows XP and later, the Windows XP activation feature requires that the operating system on restored disks be reactivated because previous activation was relevant to a specific disk ID.

When restoring a disk with Tivoli Storage Manager FastBack for Bare Machine Recovery, you can complete the following tasks:

- Restore any successful snapshot, both full and incremental.
- Boot your system, connect to the network, and run Tivoli Storage Manager FastBack for Bare Machine Recovery that connects to a FastBack Server.
- When a disk restore process is initiated, create a new master boot record with up to three primary partitions followed by logical partitions. The original layout of the disk is not maintained.
- Take snapshots that can be volumes of dynamic or basic disks. However, the restore process creates a basic disk.
- Create any combination of user-selected volumes. Retain the original disk-layout in order to avoid unpredictable operating system behavior.
- If the restore of one or more volumes fails, the empty or allocated partition is available on the disk and it can be allocated manually by the Microsoft Disk Manager tool.

If the destination disk is dynamic or has volumes, all previous information on the disk is erased. The restored disk is not identified by the server that owns the destination disk until a refresh is complete. To refresh, go to the following menu: **MMC → Storage → Disk Management → Rescan Disks.**

You should test the FastBack for Bare Machine Recovery CD in your environment during regular operation (before a disaster occurs) to confirm that all the necessary hardware drivers are already on the CD. Tivoli Storage Manager FastBack for Bare Machine Recovery of EISA partitions must be included in the backup snapshot in order for the system to be properly restored.

x64 (AMD64 and EM64T) processors with Microsoft Windows 32-bit or 64-bit operating systems

The procedure for using Tivoli Storage Manager FastBack for Bare Machine Recovery on the x64 (AMD64 and EM64T) processors with Windows 32-bit or 64-bit operating systems is identical to using Tivoli Storage Manager FastBack for Bare Machine Recovery on the x32 processors with Windows 32-bit operating systems.

UEFI platform machines (IA64 - Intel Itanium or X86 processors)

UEFI systems depend on NVRAM parameters and a different disk layout (GUID partition table disk) than the layout used on MBR disk BIOS systems. Tivoli Storage Manager FastBack for Bare Machine Recovery on an UEFI system requires that you configure the NVRAM, EFI partition, utility partitions, and system partition for the UEFI system, and restore the original system data partition. Restoring the original system data partition requires that the boot disk being restored is accessible by a second, functioning UEFI-based system running the FastBack Client software.

To configure the NVRAM, EFI partition, utility partitions, and system partition for the UEFI system, complete the following steps:

1. Identify the original volume that you want to restore. For example, you could restore the C:\ volume on the UEFI system. In the following steps, the volume you want to restore is referred to as the original system. The EFI partition does not need to be backed up. The EFI partition is created later.
2. Physically install the target hard disk on the original system. This hard disk must be large enough to contain the EFI partition, utility partitions, and system partitions of the original system. The target disk must be at least the same size as the source disk. The disk must be installed as a primary disk on the UEFI system. Because the source disk is faulty, the source disk should be removed from the UEFI system.
3. Boot the original system with the utility CD from the manufacturer. The disk is used for installing a new UEFI system.
4. Run an express setup, or an equivalent type of setup.
5. Use the following procedure to install a regular Windows Itanium or 2008 version on this hard disk:
 - a. After the Windows setup has copied the setup files, let the installation process continue to build the correct partition.
 - b. The Windows installation process prompts you to choose a type of installation: Express or Manual. Choose **Manual**. This installation choice is required so you can later specify partition size settings.
 - c. When the installation process asks for the size of the Windows partition, make the partition at least the same size as the Windows partition on the original system.
 - d. Complete the installation process.
6. Shut down the original system and remove the hard disk. You need this hard disk when restoring the original system data partition.

To restore the original system data partition, complete the following steps:

1. Install the hard disk that you removed at the end of the configuring the NVRAM, EFI partition, utility partitions, and system partition for the UEFI system section. This hard disk is a second disk, on a different UEFI system, that is running the FastBack Client. In the following steps, the second UEFI system is referred to as the functioning system.

In order to install this hard disk as a second disk on the functioning system, the functioning system must be shut down before the hard disk installation process. In addition, restart the functioning system after the hard disk installation process is complete.
2. Configure the FastBack Client on the functioning system to connect to the server that contains the system partition from the original system. This system partition should be the partition that you want to restore.
3. Run a volume restore of the system volume on the second hard disk in the functioning system from the FastBack Manager snapshot monitor window. Restore the snapshot on the system partition. Do not restore to another partition on the disk. You are going to overwrite the default system volume installed by Windows.
4. After the volume restore process, shut down the functioning system.
5. Remove the second disk.
6. Reinstall the hard disk as the primary disk in the original system.
7. Restart the original system.

8. Connect the FastBack Client on the original system to the appropriate server.
9. Restore additional partitions on the disk using the standard volume restore process from FastBack Manager.

Note: The FastBack for Bare Machine Recovery CD does not load on UEFI systems.

Access permissions

Tivoli Storage Manager FastBack for Bare Machine Recovery can be used from sources and to destinations that the currently logged user is authorized to access.

SuperAdmin users have unlimited restore access. These users can be either Active Directory users, or FastBack Manager domain users belonging to the **SuperAdmin** group.

Active Directory users that are not **SuperAdmin** users require Share and ACL read permissions to all source volumes root directories in the disk, and Share and ACL modify permissions to all destination volumes root directories in the disk. The source permissions are those that were granted during backup, while the destination permissions are those granted at restore time. Share permissions are not required if both Source and Destination are on the same computer as the Tivoli Storage Manager FastBack, from which the restore operation is being initiated.

Note: Permissions are not checked for target disks without partitions. Only **Admin** users can access target disks with unformatted partitions, and source and target volumes that are not mapped to any Clients.

Figure 1 on page 6 displays the access permissions.

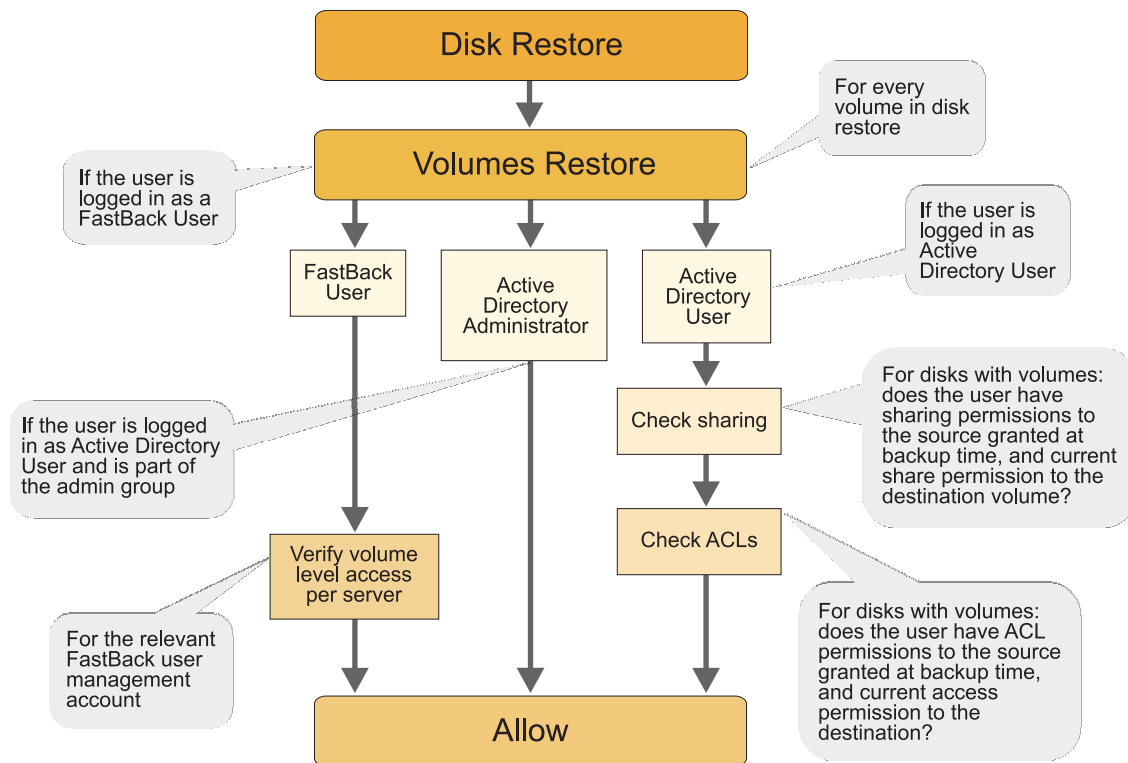


Figure 1. Tivoli Storage Manager FastBack for Bare Machine Recovery access permissions

Using the FastBack for Bare Machine Recovery CD

To restore a volume to a computer in situations where the disk or the operating system have become corrupted, or in other situations that caused server failure you have to create a FastBack for Bare Machine Recovery CD to use with Tivoli Storage Manager FastBack for Bare Machine Recovery.

The procedure consists of two phases:

- If necessary, repairing or replacing the damaged hardware.
- Restore using the Tivoli Storage Manager FastBack for Bare Machine Recovery on the FastBack for Bare Machine Recovery CD. You must create the FastBack for Bare Machine Recovery CD.

When creating the FastBack for Bare Machine Recovery CD, consider the following items:

- Each user must create their own customized CD that includes storage drivers.
- When using the FastBack for Bare Machine Recovery CD, only Active Directory group users and Tivoli Storage Manager FastBack administrators can restore.
- The FastBack Server service does not need to run in order to use Tivoli Storage Manager FastBack for Bare Machine Recovery.
- If the BIOS on the booting computer is set to boot from a drive other than the DVD drive, change the BIOS to boot from the DVD drive and reinsert the CD.

Any-to-Any HW Restore utility

If the restored data structure does not match the hardware configuration of the destination disk, the operating system cannot run. In addition, after a restart, a blue screen is displayed on the restored system.

In order to correct this problem, use the Any-to-Any HW Restore utility, included on the FastBack for Bare Machine Recovery CD. This utility provides various diagnostic tools. You can use the utility to identify and correct problems related to data structure or mass storage driver differences. For information about how to use the Any-to-Any HW Restore utility, see “Using the Any-to-Any Hardware Restore utility” on page 16.

CAUTION:

Depending on the symptoms and troubleshooting progress, use the Any-to-Any HW Restore utility features with caution, and at your discretion, to solve the dissimilar hardware issues and complete the restore. Perform step-by-step changes using the utility, while restarting after each individual change. For instance, install a driver, restart to see how it affects the system, make another change and restart again, and so forth.

Customizing volume layout

You can use Tivoli Storage Manager FastBack for Bare Machine Recovery to customize volume layout. Disks can also be restored for other purposes than system-level restore.

The following information lists the examples where you can restore disks for other purposes:

- Various volumes that were originally located on different disks or different servers.
- Various volumes that were snapped at different times.
- Same volume at different points in time.

If the disk to be restored is a boot disk, unpredictable behavior of the operating system can occur under the following conditions:

- Your operating system originally resided in a specific volume, for example, the second volume on the disk. The operating system was restored to another volume, for example, the first volume on the disk. Change the `boot.ini` file manually to reflect the changes.
- Your swap files originally resided on a number of volumes (for example, C: and D:), and only some of the volumes were restored (for example, C: only). Recover all volumes that have swap files.
- You originally had a multi-boot system (for example, three operating systems on the C, D, and E drives) and you restore only one volume. Change the `boot.ini` file manually to reflect the changes. For more information about how to configure the ARC naming paths used in the `boot.ini` file, you can refer to the *Microsoft Knowledge Base Article 102873: BOOT.INI and ARC Path Naming Conventions and Usage*.
- Software applications originally distributed over a number of disks were partially restored.

Chapter 2. Creating a FastBack for Bare Machine Recovery CD for your Windows system

To build the FastBack for Bare Machine Recovery CD you must download several software packages and complete customization procedures to fit the CD to your environment.

Before you can create a FastBack for Bare Machine Recovery CD for your Windows system, ensure you have the following software and hardware components:

- CD writing (burning) software.
- Recordable CD drive.
- Internet connection for downloading software packages from the Web.
- A system with a 32-bit Windows XP, Windows 2003, or Windows Vista operating system installed.
- 1 GB of free disk space to build the CD image.

To create a FastBack for Bare Machine Recovery CD, complete the following steps:

1. Download the Tivoli Storage Manager FastBack for Bare Machine Recovery base code package that you downloaded from either Passport Advantage or the IBM Support Fix Central Web site.
2. Download and install the Microsoft Windows Automated Installation Kit (AIK) on a 32-bit operating system. You can download the latest Microsoft Windows AIK from the Microsoft Web site: <http://www.microsoft.com/downloads/details.aspx?familyid=94BB6E34-D890-4932-81A5-5B50C657DE08&displaylang=en>.

After the download is complete, create a CD from the downloaded image using your CD burning software and install the AIK software following the instructions on the Windows Automated Installation Kit (AIK) Web site.

In order to install additional languages, you need this Windows AIK CD that you just created. Microsoft PE is part of the AIK package you download and install.

3. Create a temporary work folder on a local disk. In this document, the example temporary work folder is labeled \FastBackBMR and is located at the root of C:. The work area is used to create the bootable CD image. You only need to create the parent folder for this step. The rest of the folders contained in the parent folder are created in the subsequent steps.
4. (Optional) Download approved storage drivers for Microsoft Windows PE. If you have systems with storage that are not supported by the Windows 2008 PE, you have to add your own drivers. For Microsoft PE to recognize your storage devices, you need to customize your CD image with storage drivers that are suitable for your environment.

To download approved storage drivers, see <http://www.ibm.com/support/docview.wss?rs=3508&context=SS9NW2&uid=swg21385896>. Ensure that you download storage drivers to match both your existing and future systems.

Copy the drivers into the \FastBackBMR\PEDrivers\StorageDrivers folder by completing the following steps:

Note: In addition to the following list of steps, each storage driver might require additional steps to complete installation and configuration. For

complete instructions, see instructions at <http://www.ibm.com/support/docview.wss?rs=3508&context=SS9NW2&uid=swg21385896>.

- a. Create a folder in the **FastBackBMR** folder named **PEDrivers**.
- b. Create a folder in the **PEDrivers** folder named **StorageDrivers**.
- c. Copy all the downloaded drivers to the **StorageDrivers** folder.

The Windows PE software includes a predefined set of drivers. For any advanced customization procedures, ensure that you download the Windows 2008 drivers, so that they are compatible with the Microsoft Preinstallation Environment (PE).

5. (Optional) Download approved network drivers for Microsoft Windows PE. If you have systems with network cards that are not supported by the Windows 2008 PE, you have to add your own network drivers. For Microsoft PE to connect to the repository over the network, customize the CD image with network drivers that are suitable for your environment.

To download the approved network drivers, see <http://www.ibm.com/support/docview.wss?rs=3508&context=SS9NW2&uid=swg21385896>. Download network drivers to match both your existing and future systems.

Copy the drivers to the `\FastBackBMR\PEDrivers\NetworkDrivers` folder by completing the following steps:

- a. Create a folder in the **FastBackBMR** folder named **PEDrivers**.
- b. Create a folder in the **PEDrivers** folder called **NetworkDrivers**.
- c. Copy all the downloaded drivers to the **NetworkDrivers** folder.

6. (Optional) Download and install the data recovery utility, TestDisk, by completing the following steps.

- a. Download the latest version of TestDisk from this Web site:
http://www.cgsecurity.org/wiki/TestDisk_Download.
- b. Save the download of the TestDisk image to your system. Complete the following steps:
 - 1) Run the Extraction Wizard by right-clicking the downloaded image and selecting **Extract All**.
 - 2) In the **Select a folder** page, type the work area directory, for example, `C:\FastBackBMR`.
 - 3) After the extraction is complete, rename the extracted folder (it is named something similar to `testdisk-6.9`) to **TestDisk**.

7. (Optional) Download and install the file viewer, Lister, by completing the following steps:

- a. Download the latest 32-bit version of Lister from this Web site:
<http://www.ghisler.com/lister/>
- b. After the download is complete, extract the file to the designated storage area under `\FastBackBMR\Lister\`

Additional utilities, like TestDisk and Lister, can be downloaded and placed on the FastBack for Bare Machine Recovery CD. You can follow steps similar to steps 6 and 7. No add-on utilities are supported by IBM. For issues with add-on utilities, contact the vendor.

8. Create a FastBack for Bare Machine Recovery CD ISO image. Complete the following steps:

- a. Insert the *Tivoli Storage Manager for Bare Machine Recovery base code package* CD into your CD-ROM drive.
- b. Click **Start** → **Run**. Type `cmd` to open a command line window.

- c. Change to the CD-ROM drive where the FastBack for Bare Machine Recovery CD is located.
- d. Browse to the *Installation* folder.
- e. Run the following script:
BuildTSMFastBackBMRCD.bat
- f. Type the path to the Microsoft AIK installation folder, for example, C:\Program Files\Windows AIK.
- g. Type the path to the work area, for example, C:\FastBackBMR.
- h. Type the path for the installation folder. The default path follows:
C:\Program Files\Tivoli\TSM\FastBack\bmr\FastBackWinBMR.
- i. Select the desired language to localize the FastBack for Bare Machine Recovery CD. Table 1 lists the languages that are supported by Tivoli Storage Manager FastBack for Bare Machine Recovery.

Table 1. Additional language support

| Language | Language Code |
|-------------------------|---------------|
| Arabic (Saudi Arabia) | AR-SA |
| Czech | CS-CZ |
| Danish | DA-DK |
| German | DE-DE |
| Greek | EL-GR |
| English (United States) | EN-US |
| Spanish (Spain) | ES-ES |
| Finnish | FI-FI |
| French (France) | FR-FR |
| Hebrew | HE-IL |
| Hungarian | HU-HU |
| Italian | IT-IT |
| Japanese | JA-JP |
| Korean | KO-KR |
| Norwegian | NB-NO |
| Dutch | NL-NL |
| Polish | PL-PL |
| Portuguese (Brazil) | PT-BR |
| Portuguese (Portugal) | PT-PT |
| Russian | RU-RU |
| Swedish | SV-SE |
| Turkish | TR-TR |
| Chinese (China) | ZH-CN |
| Chinese (Hong Kong) | ZH-HK |
| Chinese (Taiwan) | ZH-TW |

- j. If you select a language other than English (EN-US), you need to provide the path to the Windows AIK CD to copy the required language files. Type the drive letter of the Windows AIK CD.

Note: If you only have one CD/DVD drive, copy the contents of the Windows AIK CD to a local drive, for example, C:.

- k. The script creates an ISO image of the FastBack for Bare Machine Recovery CD under the output directory in the work area folder, for example, C:\FastBackBMR\Output\winpe_x86.iso.
- l. Keep a copy of the log file that is reported at the completion of the build. You can use this log file to provide future verification of drivers included on the CD.
- m. Burn this image to a CD to be used for a system recovery.

Chapter 3. Using Tivoli Storage Manager FastBack for Bare Machine Recovery

This section describes the tasks needed to use Tivoli Storage Manager FastBack for Bare Machine Recovery to either boot your operating system from a FastBack for Bare Machine Recovery CD or use a non-system disk restore from FastBack Manager.

Using the FastBack for Bare Machine Recovery CD for bare machine recovery

If you want to boot your operating system from the FastBack for Bare Machine Recovery CD, follow the steps in this section. You should also follow these steps if, when you boot, you see a blue screen.

Specifically, if you see a blue screen, you can use the FastBack for Bare Machine Recovery CD to navigate to the Any-to-Any HW Restore utility. Using the Any-to-Any HW Restore utility, you can complete the following repair tasks:

- Create a backup of the current Windows status.
- Update storage drivers. For incorrect storage drivers, a blue screen with the following message is displayed: STOP: 0x0000007B . An incorrect jumper setting on an IDE or SCSI driver can also cause this stop error.
- Change the keyboard and mouse drivers.
- Change Hardware Abstraction Layer (HAL).
- Disable services.
- Disable AutoReboot.
- Remove upper and lower filters.

To use the FastBack for Bare Machine Recovery CD for bare machine recovery, complete the following steps:

1. Insert the FastBack for Bare Machine Recovery CD into the drive of the failed system. This CD provides a bootable environment you use to connect to the network, run Tivoli Storage Manager FastBack for Bare Machine Recovery, and connect to the backup storage location.
2. Click **Accept** to accept the License agreement. After you click **Accept**, a delay might occur as the installation process moves to the next step. If you click **Decline**, the application closes and reboots.
3. Select a network adapter. Most environments are able to receive DHCP configuration information so you do not need to manually type IP configuration information.
4. Click **Next**. The Remote FastBack repository Share Credentials window is displayed.
5. Type the Windows domain, user name, password, and Windows network share for the user who has access permissions to the backup storage location. The FastBack Server service does not need to run for the bare machine recovery to work.
6. Click **Next**.

7. Select a repository. Click **Refresh** to refresh the list of snapshots. If you click **Remove**, the selected repository is no longer displayed in the Select repository list. If you click **Close**, Tivoli Storage Manager FastBack for Bare Machine Recovery closes and a message is displayed. The message asks if you want to restart the system.
8. After you select a repository, select a system drive snapshot from the repository. Snapshots are defined by policy name, server, volume, and date.
9. Use one of the following procedures:
 - Option 1: Add a snapshot to restore one or more snapshots to a destination disk. By adding a snapshot, you create a partition table on the destination disk. The partition table is set up according to how many snapshots you are restoring. To add a snapshot, complete the following steps:
 - a. Click **Add Snapshot**. The snapshot is displayed in the Bare Machine Recovery Snapshots section.
 - b. Repeat the previous step for each partition on the target disk. You restore the additional snapshots to the same disk, but under a different partition on the target disk. The partition table is created based on the number of snapshots that you recover. For more details, refer to the following table:

Table 2. Partition table details

| Number of recovered snapshots | Partition table |
|-------------------------------|---|
| 1 snapshot | 1 primary partition is created |
| 2 snapshots | 2 primary partitions are created |
| 3 snapshots | 3 primary partitions are created |
| 4 snapshots | 3 primary partitions and 1 extended partition with 1 logical drive are created |
| 5 snapshots | 3 primary partitions and 1 extended partition that has 2 logical drives are created |

Each additional snapshot creates an additional logical drive within that last extended partition.

The order in which the snapshots are selected dictates the order in which they are restored to the destination disk. If the disk being restored had an EISA partition as the first partition, complete the following steps:

- 1) Select the volume with the EISA partition.
- 2) Select the volume with the operating system and boot information.
- 3) Select any additional volumes to restore.

Retain the original volume order in order to prevent unpredictable operating system behavior.

- c. Click **Restore**. The Bare Machine Recovery - Choose destination disk window is displayed.
- d. Select a destination disk that is large enough to meet the disk space requirements of the snapshots selected in steps 9a and 9b.
- e. For the **Bootable partition**, select the partition that you want to use. You can select **None**. If the first partition to be restored is an EISA partition, and you choose to make the first partition bootable, the selection is ignored and the next partition is made bootable.

Choose only one of the first three partitions as the primary boot partition. Other partitions are extended volumes, and Windows cannot boot from them.

- f. For **Disk signature**, select one of the following options:
 - **Use original disk signature:** The snapshot signature is used. This is the default value and it is uncommon to change this default.
 - **Use existing disk signature:** The selected destination disk signature is used.
 - **Set disk signature manually:** The **Selected signature** field is used to manually define the signature. The signature can contain up to 8 hexadecimal characters.
- g. View the values for required disk space. **Required disk space** indicates the amount of disk space required for the restore process. **Available disk space** is updated according to the selected disk. If the selected disk is too small, the field is highlighted with the color red.
- h. Click **Start disk restore**. A summary is displayed. The summary includes the snapshots that are being restored. If there is not enough space on the destination disk, you cannot proceed.
- i. Click **Yes** to proceed or **No** to go back to the Disk Selection window. If you click **Yes**, all data on the destination disk is erased.
- j. Monitor progress for the restore process in the Bare Machine Recovery Snapshots section. Wait until all snapshots are marked as complete.
- Option 2: (Optional) Complete a volume restore to restore one, and only one, snapshot to the destination disk. If the drive is not bootable before the volume restore, the volume restore does not make the drive bootable. The restored snapshot is the operating system partition.

This option is not intended for restoring to a new disk or new system. This volume restore option should be used to restore the system volume of the original system with the original hardware. You are restoring the system volume backup on the original system volume.

This option should be used **ONLY** for restoring an existing system volume to a previous state using its snapshot. It is a very uncommon scenario and the vast majority of users should **NOT** use this option.

To complete a volume restore, complete the following steps:

- a. After selecting a snapshot and policy, click **Volume Restore**.
- b. Select the destination partition.
- c. Click **OK**.
- d. Restart the system.

Complete the volume restore if you want to revert only the operating system volume to a previous version of the operating system. For example, if you upgraded to a new operating system version, but want roll back to the previous version of the operating system, use the volume restore. You can also use the volume restore if an operating system volume is corrupt or infected by a virus, and you want to go to a previous snapshot of the operating system volume.

- 10. After the restore is complete, if the target system requires a different mass storage driver, specifically a mass storage driver different than the driver on the recovered snapshot, use the Any-to-Any HW Restore utility. For information about how to use the Any-to-Any HW Restore utility, see “Using the Any-to-Any Hardware Restore utility” on page 16.

11. Start the restored system. If the system starts successfully the Tivoli Storage Manager FastBack for Bare Machine Recovery process is complete.
If the system fails to start and you get a blue screen, the system hardware does not match the data structure for the snapshot. You can use the Any-to-Any HW Restore utility to recover data. For information about how to use the Any-to-Any HW Restore utility, see “Using the Any-to-Any Hardware Restore utility.”

Using the Any-to-Any Hardware Restore utility

If you are restoring a system to hardware that is different from the original system, click **Any-to-Any HW Restore** and use one of the following procedures:

- If a black screen is displayed when you boot the system after the restore is complete, click **Repair Storage** and complete the following steps. **Repair Storage** is available only if the TestDisk tool is available.
 1. Select a storage device to repair.
 2. Click **Repair Storage Automatically**.
 3. Click **Exit Repair Storage**.

You can repair more than one disk using the Repair Storage tool. In case the automatic storage repair fails, click **Launch Test Disk** and repair the storage manually using the TestDisk tool. For information about how to use TestDisk, refer to <http://www.cgsecurity.org/wiki/TestDisk>.

- If a black screen is not displayed when you boot the system, click **Move to Step 2** and complete the following steps:
 1. In the Step 2 section, select the location of the Windows installation that requires repair.
 2. Verify that the correct Windows version is selected.
 3. In the Step 3 section, click **Create backup** to create a backup of the current Windows settings before the repair begins. This backup can be restored later by clicking **Restore Backup**.
 4. (Optional) In the Step 4 section, use one of the following procedures:
 - To select a specific driver to install, complete the following steps.
 - a. Browse the driver list to find the required driver.
 - b. Click **Install Driver**.
 - c. (Optional) You can disable and delete all previously installed SCSI/IDE drivers by selecting **Remove other SCSI/IDE Drivers**.
 - d. After installing the drivers, you can click **Finish** or complete the optional next step.
 - To install the generic driver, first download the required driver package from a computer on which the package is already installed to a USB flash drive. Then complete the following steps.
 - a. Select **Generic Driver** from the driver list.
 - b. Click **Install Driver**. A dialog box displays a list of available drivers.
 - c. Insert the USB flash drive containing the required driver package, then browse to and select the driver.
 - d. Click **Open** to install the driver on the operating system you just restored using the bare machine recovery process.
 - e. (Optional) You can disable and delete all previously installed SCSI/IDE drivers by selecting **Remove other SCSI/IDE Drivers**.

- f. After installing the drivers, you can click **Finish** or complete the optional next step.
5. (Optional) In the Step 5 section, set the following settings:

Change keyboard mouse drivers

To reinstall keyboard and mouse drivers, select **Change keyboard mouse drivers** and click **Perform optional settings** to apply your selection.

Disable troublesome services

To disable a predefined list of services, for example, UPS services, serial and parallel ports, select **Disable troublesome services**. You can also click **Services** to manually select services to disable.

Disable Upper/Lower filters

Upper and lower filters are used by disk monitor applications, and can prevent Windows from running. In such cases, select **Disable Upper/Lower filters** to disable these filters and to run Windows. Click **Perform optional settings** to apply your selection.

Disable AutoReboot

When a message like STOP: error is displayed, also known as a blue screen, and AutoReboot is enabled, the system is automatically restarted. To prevent this automatic restart, select **Disable AutoReboot** and click **Perform optional settings** to apply your selection.

Activate SYSPREP mini-setup

Select this option to run the Windows mini-setup after the restart. Do not select this option on systems that serve as Active Directory Domain Controllers. The SYSPREP option removes the Active Directory from the system.

Services

Click **Services** to manually select services that you want to disable.

HAL Settings

Use caution when changing HAL settings. In some scenarios, you have to reinstall the Hardware Abstraction Layer (HAL) to complete an any-to-any bare machine recovery process.

When you click **HAL Settings**, information about the installed HAL is displayed. A list of alternative HALs is also displayed. To replace the current HAL, select a HAL from the list and click **Install HAL**. Some HAL conversions are not supported by Windows.

Perform optional settings

Click **Perform optional settings** to edit the sysprep.inf file.

6. (Optional) Click **Restore Backup** to restore the backup you created in Step 3.
7. (Optional) Click **Exit program** to exit the Any-to-Any HW Restore utility without saving any information.
8. (Optional) Click **Finish** to save and close the Any-to-Any HW Restore utility.

Restoring a disk using the non-system disk restore

This type of restore uses a system where FastBack Client is installed. To clone and deploy disks, the system should have an extra disk or a USB disk.

When you restore a non-system disk from FastBack Manager, the FastBack for Bare Machine Recovery CD is not used for the restore.

To restore a disk or disks to different systems using the non-system disk restore, complete the following steps:

CAUTION:

If FastBack Client is not connected to the FastBack Server, this procedure cannot be completed.

1. Before proceeding with a disk restore, close all open handles to the disk. For example, if it is open, close the Windows disk management utility on the target computer. This utility is part of Windows computer management tools.
2. Access FastBack Manager. Verify that the log on identity has privileges to run IBM Tivoli Storage Manager FastBack for Bare Machine Recovery for the relevant volumes.
3. Click **Monitor** and select the volumes to be restored by completing the following steps:

Important: Retain the original disk layout to prevent unpredictable operating system behavior.

- a. (Optional) In the Monitor Filter section, select the volumes to be displayed and click **Filter** and in the display, click the **Start Time** column header, to show the latest snapshots of the selected volumes.
 - b. Right-click the snapshots to be restored. Use the shift key to select several snapshots. If the disk being restored had an EISA partition, follow these steps:
 - 1) Select the volume with the EISA partition.
 - 2) Select the volume with the operating system and boot information.
 - 3) Select any additional volumes to restore.
4. Click **Bare Machine Recovery**.
 5. You can complete the following tasks:
 - Change the order of the volumes by selecting a volume and clicking **Up** or **Down**.
 - If you want the restored disk to be bootable, check **Make first snapshot bootable**. Ensure that the first line contains the bootable volume. Do this in order to retain the original layout and order of the disk.

Important: If the first partition to be restored is an EISA partition, and you choose to make the first partition bootable, the next partition is made bootable instead.

- Check **Preserve disk signature** to preserve the disk structure and volume letters. This is important in boot disks.
- Click **Select Destination Disk** to identify the location. There are two views available:
 - **Tree View** - shows the servers and their disks, and in addition provides a folder (Standalone Disks) containing all the standalone disks
 - **List View** - provides a summary view of all disks identified by the FastBack Server
- **Ignore open handles on the destination volume**

If there are open handles on the target restore volume, the restore does not complete successfully. Open handles are any open files or applications that

are running on the target restore volume. You can force a restore on a target volume with open handles by selecting **Ignore open handles on the destination volume** in the Restore Destination window. However, forcing a restore on a target volume with open handles can cause a problem with applications and loss of data in files that are open on the target volume.

- If you want to view properties for the disk, click **Disk properties**.
- 6. Click **Apply**. All data on the destination disk is destroyed. If one of the volumes is mounted and used by the application, the operation fails.
- 7. Click **OK** to restore the disk.

Scenarios using Tivoli Storage Manager FastBack

The following scenarios are common usage scenarios for Tivoli Storage Manager FastBack for Bare Machine Recovery.

These scenarios are listed in no particular order.

Scenario 1 - Restore complete bootable disk

You need to restore a complete bootable disk. To complete this scenario, use the instructions in “Using the FastBack for Bare Machine Recovery CD for bare machine recovery” on page 13. In the instructions, the step that describes when you specify a bootable partition states that you can select *None*. Do not select *None*. After you select a bootable partition, you can click **Start Disk Restore**.

Scenario 2 - Dissimilar restore

You need to restore more than one volume, including a boot volume, to a destination disk that is the boot disk. To complete this scenario, use the instructions in “Using the FastBack for Bare Machine Recovery CD for bare machine recovery” on page 13. Changes in the Active Directory might also be needed.

If, after you complete the restore process, you restart the system and a blue screen is displayed, use the Any-to-Any HW Restore utility. For more information about the Any-to-Any HW Restore utility, see “Using the Any-to-Any Hardware Restore utility” on page 16.

Scenario 3 - Disk restore to a second disk that is a non-system disk

You need to restore more than one volume, including a boot volume, to a destination disk that is not the boot disk. To complete this scenario, use the instructions in “Restoring a disk using the non-system disk restore” on page 17. When we create and deploy a clone disk, remember that each operating system installation has unique system environment parameters.

The following parameters should be changed manually to avoid a conflict with another system on the network. Check the following information before connecting the new system to the network, changing one or more of the following parameters:

- Machine name
- Machine GUID
- IP address
- Subnet mask

Scenario 4 - Restore only system volume

You need to restore the boot volume to the same disk and the same

volume. To complete this scenario, use the instructions in “Using the FastBack for Bare Machine Recovery CD for bare machine recovery” on page 13.

Using a single system for client and server

You can complete a bare machine recovery to a system that is used as a server and as a client.

When you start a bare machine recovery to a system that is used as a server and as a client, a message is displayed. The message indicates that the server is not accessible for synchronization. This message can be ignored. Click **Yes** to continue.

If you are going to complete a bare machine recovery to a system that serves as both FastBack Client and FastBack Server, use the following guidelines:

- For repositories, the following requirements must be met:
 - Do not use disk repositories. Volume, folder, or network share repositories can be used.
 - Do not locate the repository on the same disk as the system drive.
 - Do not backup the repository location.
 - You can have multiple repository locations on a dynamic disk or on a basic disk.
- The FastBack Client that is on the FastBack Server should be configured as *SAN Enabled*. If the client is not *SAN Enabled*, performance is slower, there are problems with volume restore, and the disks can be displayed twice in the FastBack Manager disk view.

Chapter 4. Troubleshooting

This information describes some common problems that you might have with the Tivoli Storage Manager FastBack for Bare Machine Recovery and provides possible solutions.

Problem

When you boot from the FastBack for Bare Machine Recovery CD using a static IP address, the IP address is not resolved. This problem occurs when the system used to resolve the IP address is a Windows Internet Name Service server (WINS). In the IP configuration window, you configure the client IP address and DNS server address, but there are no fields to help you configure the WINS.

Solution

Use IP addresses when you connect to the repository, or manually configure the WINS. To manually configure the WINS, complete the following steps:

1. When the IP address configuration window is displayed, click **Next**.
2. In the window that requests credentials, click the icon for information.
3. Click **Command prompt**.
4. In the command prompt window, add the WINS. The following string is an example of how to add the WINS:

```
netsh interface ipv4 add winsserver "local area  
connection" [WINS IP address]
```

Problem

When downloading the Windows Automated Installation Kit (AIK) from Microsoft, you are not sure what version to download.

Solution

There are two versions of the Windows Automated Installation Kit (AIK):

- The old version labeled Windows Automated Installation Kit (AIK). This version was posted in 2007.
- A current version labeled Automated Installation Kit (AIK) for Windows Vista SP1 and Windows Server 2008. This version was posted in 2008.

Use the current version of the Windows AIK.

Problem

After you download the Windows Automated Installation Kit (AIK), you are not sure what to do next.

Solution

If the downloaded file is an IMG file, change the file extension to ISO. Burn the ISO file content to a CD or mount with an ISO mounting utility. You can then install the Windows Automated Installation Kit (AIK).

Problem

How are mass storage drivers loaded?

Solution

Select "Browse for a storage driver" and click "Install Driver". In the dialog box that opens, browse for the driver you want to install. After you complete the driver installation, click "Finish" and close the application to restart the machine.

Problem

During the Tivoli Storage Manager FastBack for Bare Machine Recovery build process, an error occurs.

Solution

Verify that there is sufficient space to build the ISO image. In addition, verify that the image is built on a Windows 32-bit operating system.

Problem

What are the requirements for booting in a VMware environment?

Solution

If you are booting in a VMware environment, make sure that you allocate enough memory to meet the memory requirements on the guest VMware system. If you have less memory on the system, the user interface for the software does not display.

For more information about supported environments, including memory requirements, see “x86 processors (32-bit) with Windows 32-bit operating systems” on page 2.

Problem

When using the FastBack for Bare Machine Recovery CD for bare machine recovery, a network adapter cannot be selected.

Solution

The network adapter cannot be identified. See step 5 on page 10 to verify that the correct network drivers needed for the particular network adapter have been downloaded and placed in the \FastbackBMR\PEDrivers\NetworkDrivers folder.

Problem

After completing information in the remote FastBack repository share credentials window, click **Next**. An error message is displayed. When using the FastBack for Bare Machine Recovery CD for bare machine recovery and selecting the network adapter, the IP address was not updated to match the network adapter.

Solution

After you select the network adapter, the IP address should be updated. If this update does not occur, or, if the Windows domain, user name, password, and path to the repository share are not configured correctly, the system cannot access the FastBack Server repository and a message is displayed. If the message code is FBSP7024, the FastBack for Bare Machine Recovery CD was created on a Windows 64-bit system. You need to rebuild the FastBack for Bare Machine Recovery CD on a Windows 32-bit operating system.

If the message code is FBSP7008E, open a command prompt window and complete the following steps:

1. Enter the netsh command to manually configure the network adapter IP configuration. For example:

```
netsh interface ipv4 set address "Local Area Connection" static 192.168.100.145 255.255.255.0 192.168.100.1
```
2. Enter the ipconfig command to confirm the Windows IP configuration settings. For example:

```
ipconfig
```
3. Enter the net use command to map a network drive to the repository share. For example, if the repository share *FB_REP_E* is located on a system at the IP address *192.168.100.100*, issue the following command:


```
net use M: \\192.168.100.100\FB_REP_E
```

A message stating the command was completed successfully should be displayed. Confirm the network drive is available by entering the following command:

```
net use
```

4. Manually start the Fastbackmount.exe program in bare machine recovery mode by entering the following command:

```
M:\FastBackBMR\mount\Fastbackmount -bmr -load M: user=Administrator  
domain=TSMFBDOMAIN password=xxxxx -pe 5.5.3.0 -log X:\
```

M: represents the drive letter for the repository. Continue with step 7 on page 14 and identify the network share name that you created when selecting the repository share in step 3 on page 22.

If FastBack Mount does not start from the command line, you can start FastBack Mount from the Windows Task Manager by completing the following steps:

- a. Enter the net use command. Include the repository drive and IP address in the command. For example:

```
net use M: \\192.168.100.1\FB_REP_E
```

A message reports that the password is not valid. Enter the user name and password.

- b. Enter the taskmgr command. For example:

```
taskmgr
```

- c. In the Windows Task Manager window, click **New Task**.

- d. Enter the following command:

```
M:\FastBackBMR\mount\Fastbackmount -bmr -load M: user=Administrator  
domain=TSMFBDOMAIN password=xxxxx -pe 5.5.3.0 -log X:\
```

If errors occur, additional information about the error is displayed. For example, if there are mismatched Windows system DLL files, a message is displayed.

Note: Errors are reported to the command prompt and logged to the .SF file that is stored at the root of the X:\RAM-DISK drive.

Problem

When using the FastBack for Bare Machine Recovery CD for bare machine recovery and choosing a destination disk, you do not see any disk devices listed.

Solution

The necessary storage driver was not loaded because of a missing or incorrect Windows driver. Go to the FastBackBMR/StorageDrivers directory and look at the contents of the PEDrivers folder. You should have created this folder when you created the FastBack for Bare Machine Recovery CD. Confirm the necessary driver is in the folder. For more information about downloading approved storage drivers for Microsoft Windows PE, see step 4 on page 9.

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A privilege that permits the access or use of an object.

Bare Machine Recovery

A solution that you can use to recover entire systems to a comparable server, to a new server with different hardware, or to a virtual machine.

blue screen

An error screen that is displayed after a critical system error occurs. The error can cause the system to shut down to prevent damage.

boot disk

A boot disk will allow you to boot off of a diskette instead of your hard drive.

boot volume

The disk drive that contains the operating system files and supporting files. There is only one system volume, but there is one boot volume for each operating system in a multi-boot system.

clone disks

An identical copy of a disk.

destination disk

The disk to which a program is installed.

disk signature

Used by some operating systems to store system-related information. For example, some operating systems use the disk signature to store persistent mappings between disk partitions and driver letters.

hard disk

A nonremovable storage medium used for storage of data on a personal computer.

network adapter

A physical device, and its associated software, that enables a processor or controller to be connected to a network.

network driver

A program that allows two or more computers or work stations to interoperate over a communications network. The computers or work stations may be heterogeneous or homogeneous devices. Services provided by a network driver can include file sharing, remote database access, electronic mail, remote print services, time services, security services, data conversion, remote function call, and work station emulation.

source disk

The disk from which information is read.

storage driver

A program that tells the operating system and other software how to communicate with a piece of storage hardware.

system partition

A group of non-overlapping nodes on a switch chip boundary that act as a logical system.

target disk

Synonym for *destination disk*.



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