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SafeGuard Enterprise Tools guide

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1 About this guide

This guide explains the usage of SafeGuard Enterprise tools provided in the tools directory of your SafeGuard Enterprise software delivery.

The following tools are covered in this document:

- SGNState
- SGNRollback
- BE_Restore.exe
- BEInvVol.exe
- opalinvdisk.exe

Note:

You can also find the Recover Keys tool (RecoverKeys.exe) in the tools directory of your Client software delivery. The tool Recover Keys is used to start a Challenge/Response procedure to regain access to the computer in a complex recovery situation, for example when the POA is corrupted and the computer needs to be booted from the SafeGuard recovery disk. The tool is on the recovery disk and is additionally available in the tools directory. You will find a detailed description of the tool in the SafeGuard Administrator's help, keyword Challenge/Response using Virtual Clients.

Intended audience

The intended audience for this guide are administrators working with SafeGuard Enterprise as security officers.

2 Displaying the system status with SGNState

SafeGuard Enterprise offers the command line tool SGNState for displaying information on the current status (encryption status and further detailed status information) of the SafeGuard Enterprise installation on an endpoint computer.

You will find the tool in the Tools directory on your SafeGuard Enterprise Client software folder.

Reporting

SGNState can also be used as follows:

- The SGNState return code can be evaluated on the server using third-party management tools.
- SGNState /LD returns output that is formatted for LANDesk which can be diverted to a file.

Parameters

You can call SGNState with the following parameters:

SGNSTATE [/?] [/L] [/LD]

- Parameter `/?` returns help information on the available SGNState command line parameters.
- Parameter `/L` shows the following information:
 - Operating system
 - Installed SafeGuard Enterprise version
 - POA type (BitLocker, SafeGuard Enterprise or Opal)
 - POA status (on/off)
 - Wake on LAN status (on/off)
 - Server name
 - Logon mode
 - Date (and time) of the last data replication
 - Encryption status (encrypted/not encrypted), algorithm used for the individual volumes
- Parameter `/LD` returns this information formatted for LANDesk.

3 Reverting an unsuccessful installation with SGNRollback

If there is an unsuccessful attempt to install SafeGuard Enterprise on an endpoint computer, the computer may be unable to boot and may be inaccessible for remote administration.

For situations of this kind SafeGuard Enterprise offers the tool SGNRollback.

SGNRollback automatically reverts the effects of an unsuccessful installation of SafeGuard Enterprise by

- enabling the blocked computer to boot,
- removing SafeGuard Enterprise and
- undoing any modifications to the GINA and other system operating components.

SGNRollback is available as a program in the tools directory of your SafeGuard Enterprise Admin software folder and is started from a Windows-based recovery system, either WindowsPE or BartPE.

3.1 Usage scenario

SGNRollback can repair an unsuccessful SafeGuard Enterprise installation on an endpoint computer, if the following applies:

- The Power-on Authentication freezes during the first startup and the computer can no longer boot.
- The hard drive is not encrypted.

Note:

Migration from SafeGuard Easy to SafeGuard Enterprise is not supported.

Further prerequisites

For using SGNRollback the following further prerequisites apply:

- SGNRollback works on the recovery systems WinPE and BartPE. To be able to use SGNRollback for recovery, integrate it into the required recovery system. Please see the relevant recovery system documentation for further information.

If SGNRollback is to be started by autorun, the administrator using SGNRollback has to define the relevant settings in WinPE (*see [Enabling SGNRollback autostart for Windows PE](#) (page 5)*) or BartPE (*see [Enabling SGNRollback autostart for BartPE](#) (page 5)*).

- SafeGuard Enterprise Device Encryption is installed.

Supported operating systems

SGNRollback supports the following operating systems:

- Windows XP
- Windows Vista
- Windows 7

3.2 Starting SGNRollback in the recovery system

You can start SGNRollback manually or add it to the recovery system autostart.

3.2.1 Enabling SGNRollback autostart for Windows PE

To enable SGNRollback autostart for Windows PE, install the Microsoft Windows Automated Installation Kit. The Windows Preinstallation Environment User Guide describes how to build a Windows PE environment and how to autostart an application.

3.2.2 Enabling SGNRollback autostart for BartPE

To enable SGNRollback autostart for BartPE, do as follows:

1. Use the BartPEBuilder version 3.1.3 or higher to create a PE image. For further details see the BartPE documentation.
2. In the BartPE Builder, add the recovery tool folder in the **Custom** field.
3. Build the image.
4. Copy the file AutoRun0Recovery.cmd from the SafeGuard Enterprise Media to the i386 folder of the BartPE-prepared Windows version.

5. Create an AutoRun0Recovery.cmd with the following two lines of text:

```
\Recovery\recovery.exe  
exit
```

6. Run the PEBuilder tool from the command line:

```
Pebuilder -buildis
```

A new iso image is built which includes the autorun file.

7. Save the resulting image on a recovery media.

When booting this image SGNRollback will start automatically.

3.3 Parameters

SGNRollback can be started with the following parameter:

-drv WinDrive	Indicates the letter of the drive the SafeGuard Enterprise installation to be repaired is on. This parameter can only be used in recovery mode. It has to be used on multi-boot environments to indicate the correct drive.
----------------------	---

3.4 Reverting an unsuccessful installation

To revert the effects of an unsuccessful SafeGuard Enterprise installation on an endpoint computer, proceed as follows:

1. Boot the computer from the recovery media containing the recovery system including SGNRollback.
2. Start SGNRollback in the recovery system. If autorun applies, SGNRollback will start automatically. SGNRollback prepares the operating system for the uninstallation of SafeGuard Enterprise.
3. You are now asked to remove the recovery media. After you remove the media, the computer will be rebooted in safe mode of the operating system.

All modifications made are removed and SafeGuard Enterprise is uninstalled.

4 System recovery and the recovery tool BE_Restore.exe

The SafeGuard Enterprise boot process

SafeGuard Enterprise encrypts files and drives transparently. Boot drives can also be encrypted, so decryption functionalities such as code, encryption algorithms and encryption key must be available very early in the boot phase. Therefore encrypted information cannot be accessed if the crucial SafeGuard Enterprise modules are unavailable or do not work.

4.1 Restoring a corrupted MBR

The SafeGuard Enterprise Power-on Authentication is loaded from the MBR on a computer's hard disk. When the installation is done, SafeGuard Enterprise saves a copy of the original - as it was before the SafeGuard Enterprise installation - in its kernel and modifies the BPR loader from LBA 0. In its LBA 0, the modified MBR contains the address of the first sector of the SafeGuard Enterprise kernel and its total size.

Problems with the MBR can be resolved using the SafeGuard Enterprise recovery tool **BE_Restore.exe**. This tool is a Win32 application and must run under Windows - not under DOS.

A faulty MBR loader will mean an unbootable system. It can be restored in two ways:

- Restoring the MBR from a backup,
- Repairing the MBR

To restore a corrupted MBR successfully, prepare as follows:

1. We recommend that you create a Windows PE (Preinstalled Environment) CD.
2. To use the client recovery tool **BE_Restore.exe** several additional files are required. You can find the tool and the required files in your Client software folder under folder **tools\KeyRecovery and Restore**. Copy all files in this folder to a memory stick. Make sure that you store all of them together in **the same** folder on your memory stick. Otherwise the recovery tool will not start properly.
3. If necessary adjust the boot sequence in the BIOS and select the CD-ROM to be first.

Note:

BE_Restore.exe can only restore or repair the MBR on disk 0. If you use two hard disks and the system is booted from the other hard disk, the MBR cannot be restored or repaired. This is also applies when using a removable hard disk.

4.1.1 Restoring a previously saved MBR backup

Every SafeGuard Enterprise Client saves its **own computer's** SafeGuard Enterprise MBR (LBA 0 of the boot hard disk after being modified by SafeGuard Enterprise) in the SafeGuard Enterprise database. It can be exported from the SafeGuard Management Center to a file.

To restore a previously saved MBR backup, proceed as follows:

1. In the SafeGuard Management Center, click **Users & Computers** and select the relevant computer in the navigation area.

2. Right-click to display the context menu and select **Properties > Machine Settings > Backup > Export**, to export the MBR. This produces a 512 byte file with the file extension **.BKN**, which contains the MBR.
3. Copy this file to the folder on the memory stick in which the other extra SafeGuard Enterprise files are located.
4. Now insert the Windows PE Boot CD into the drive, plug in the memory stick with the SafeGuard Enterprise files and switch the computer on to boot from the CD.
5. When the computer is ready, start the cmd-box, navigate to the directory on the memory stick where the SafeGuard Enterprise files are located and run **BE_Restore.exe**.
6. Select **Restore MBR** to restore from a backup and select the **.BKN** file.

BE_Restore.exe now checks, if the selected **.BKN** file matches the computer and afterwards restores the saved MBR.

4.1.2 Repairing the MBR without backup

Even when there is no MBR backup file available locally, BE_Restore.exe can repair a damaged MBR loader. **BE_Restore.exe - Repair MBR** locates the SafeGuard Enterprise kernel on the hard disk, uses its address, and recreates the MBR loader.

This is highly advantageous, especially as there is no need for a computer-specific MBR backup file locally. However, it takes a little more time because **BE_Restore.exe - Repair MBR** has to carry out a time-consuming search for the SafeGuard Enterprise kernel on the hard disk.

To use the repair function, proceed as described, but select **Repair MBR** when running **BE_Restore.exe**.

If more than one kernel is found, **BE_Restore.exe – Repair MBR** uses the one with the most recent time stamp.

4.1.3 Partition table

SafeGuard Enterprise allows the creation of new primary or extended partitions. This causes the partition table on the hard disk with the partition to be changed.

When restoring an MBR backup, BE_Restore will see that the current MBR contains different partition tables for the LBA 0 and the MBR backup file that is to be restored (*.BKN). In a dialog, you can select the required the procedure.

4.1.3.1 Repairing an MBR with a corrupt partition table

A corrupt partition table may result in a non-bootable operating system after successful POA logon.

You can resolve this problem using BE_Restore.exe to restore a previously saved MBR or repair the MBR without an MBR backup.

If you have a backup, proceed as described for the **Restore MBR** option.

If you do not have a backup, do as follows:

1. Insert the Windows PE Boot CD into the drive, plug in the memory stick with the SafeGuard Enterprise files and switch the computer on to boot from the CD.
2. When the computer is ready, go to the command prompt, navigate to the directory on the memory stick where the SafeGuard Enterprise files are located and run **BE_Restore.exe**
3. Select **Repair MBR**. If BE_Restore.exe detects a difference between the partition table of the current MBR and the mirrored MBR, a dialog for selecting the partition table to be used is displayed.

The mirrored MBR is the original Microsoft MBR saved during the SafeGuard Enterprise Client setup to enable you to restore it, for example if you uninstall the client. The partition table in this mirrored MBR is being kept up-to-date by SafeGuard Enterprise, if any partition changes occur in Windows.

4. Select **From Mirrored MBR**.

Note:

If you select **From Current MBR**, the partition table from the current MBR - this means in this case a corrupt partition table - will be used. Not only will the system in this case remain non-bootable, but also the mirrored MBR will be updated and therefore also corrupted.

4.1.4 Windows Disk Signature

Whenever Windows creates a file system for the first time on a hard disk, it creates a signature for the hard disk. This signature is saved in the hard disk's MBR at the Offsets 0x01B – 0x01BB. Note that, for example, the logical drive letters of the hard disk depend on the Windows Disk Signature.

Example: The Windows Administrator uses the Windows hard disk manager to change the logical drive letters of the drives C:, D:, and E: to C:, F:, and Q. This deletes the Windows Disk Signature from the hard disk's MBR. After the next startup process, Windows drops into a time-consuming hard disk scan mode and restores the list of drives. The result is that the three drives have their original drive letters C:, D: and E again:

Whenever that occurs under SafeGuard Enterprise, SafeGuard Enterprise's filter driver "BEFLT.sys" is not loaded. This makes the system unbootable: The computer shows a blue screen 'STOP 0xED "Unmountable Boot Volume"'.

To repair this under SafeGuard Enterprise, the original Windows Disk Signature has to be restored in the hard disk's MBR.

This, too, is done by **BE_Restore.exe**.

Note:

You should be very careful when using any other tool to repair the MBR! For example, an old MS DOS FDISK.exe, that you use to rewrite the MBR loader ("FDISK /MBR") could create another MBR loader with no Windows Disk Signature. As well as the fact that an old tool can delete the

Windows Disk Signature, the “new” MBR loader might not be compatible with the hard disk sizes commonly used today. You should always use up-to-date versions of repair tools.

5 Decommissioning encrypted volumes with BEInvVol.exe

For SafeGuard Enterprise protected computers we provide the command line tool **BEInvVol.exe** which can be used to safely decommission encrypted volumes (hard disks, USB sticks etc.). Our command line tool is based on DoD Standard 5220.22-M, which can be used to safely delete key stores. This standard consists of seven overwrite cycles with random and alternative patterns.

This command line tool is intended to be used on computers for which the following applies:

- SafeGuard Enterprise is installed.
- Some hard disk volumes have been encrypted.

You have to run this tool within a system where the SafeGuard Enterprise encryption driver is not active. This is in order to prevent that data is decommissioned by accident. Otherwise, the tool does not work and an error message is displayed.

Note:

We recommend that you start your system from an external medium like a Windows PE CD and use the tool according to the instructions available in the command line help.

After the relevant target volumes have been decommissioned, they are longer readable.

According to DoD Standard 5220.22-M, the command line tool permanently purges the boot sectors and the SafeGuard Enterprise Key Storage Areas (original KSA and backup) of each encrypted volume by overwriting them seven times. As the random Data Encryption Keys of each volume are not backed up in the central database for SafeGuard Enterprise Clients, the volumes are perfectly sealed afterwards. Even a Security Officer cannot regain access.

The command line tool also displays information on screen about the available volumes. This includes for example the name of the volume, the size of the volume and information about boot sectors and KSAs . This information can optionally be stored in a file. The path for this file should of course point to a non-decommission volume.

Note:

Data cannot be recovered after deletion.

5.1 Starting the command line tool

Syntax

- **xl[volume]**

List information for the target volume(s). If no target volume is specified, list info for all volumes.

- **xi<volume>**

Invalidate the target volume(s), if fully SGN-encrypted. The target <volume> must be specified for this command.

- **<volume>**

Specify the target volume = {a, b, c, ..., z, *}, with <*> meaning all volumes.

Options

- **-g0**

Disable logging mechanism.

- **-ga[file]**

Logging mode -append. Append log entries at the end of the target log file or create it if it does not exist.

- **-gt[file]**

Logging mode -truncate. Truncate the target log file if it already exists or create it if it does not exist.

- **[file]**

Specify the target log file. If not specified the default target log-file is "BEInvVol.log" at the current path. Do not set this file on the same volume to be invalidated!

- **-?, -h**

Display help.

Examples

```
> beinvvol -h
```

```
> beinvvol xld
```

```
> beinvvol xle -gac:\subdir\file.log
```

```
> beinvvol xl* -gtc:\subdir\file.log
```

```
> beinvvol xif -gt"c:\my subdir\file.log"
```

```
> beinvvol xig -g0
```

```
> beinvvol xi*
```

6 Decommissioning self-encrypting, Opal-compliant hard drives

Self-encrypting hard drives offer hardware-based encryption of data when they are written to the hard disk. The Trusted Computing Group (TCG) has published the vendor-independent Opal

standard for self-encrypting hard drives. SafeGuard Enterprise supports the Opal standard and offers management of endpoint computers with self-encrypting, Opal-compliant hard drives.

For further information on Opal-compliant hard drives, see the SafeGuard Enterprise Administrator Help, chapter *SafeGuard Enterprise and self-encrypting Opal-compliant hard drives*.

For SafeGuard Enterprise protected computers we provide the command line tool **opalinvdisk.exe** which starts an optional service of Opal-compliant hard drives (**RevertSP** with parameter **KeepGlobalRangeKey** set to **False**). **RevertSP** safely decommissions Opal-compliant hard drives by reverting them to factory state and deleting keys. For further information on **RevertSP**, refer to section 5.2.3 of the Opal standard TCG Storage Security Subsystem Class: Opal, Specification Version 1.00, Revision 3.00 (available from www.trustedcomputinggroup.org).

6.1 Prerequisites and recommendations

For using opalinvdisk.exe, the following prerequisites and recommendations apply:

- Before you use opalinvdisk.exe, the Opal-compliant hard disk has to be decrypted with the SafeGuard Enterprise **Decrypt** command from the Windows Explorer context menu on the endpoint computer. For further information, see the SafeGuard Enterprise Administrator help, section *Enable users to unlock Opal-compliant hard drives* and the SafeGuard Enterprise User Help, section *System Tray Icon and Explorer extensions on endpoint computers with Opal-compliant hard drives*.
- You need administrator rights.
- We recommend that you use **opalinvdisk.exe** in a Windows PE environment.
- The tool **opalinvdisk.exe** starts the optional service **RevertSP** with parameter **KeepGlobalRangeKey** set to **False**. The actual decommissioning procedure carried out by **RevertSP** depends on the specific hard drive. For further information, refer to section 5.2.3 of the Opal standard TCG Storage Security Subsystem Class: Opal, Specification Version 1.00, Revision 3.00 (available from www.trustedcomputinggroup.org).

6.2 Run opalinvdisk.exe

1. Open a command line prompt and start **opalinvdisk.exe** with administrator rights.
Tool and usage information is displayed.

2. On the command line, enter **opalinvdisk.exe <TargetDevice>**.

For example: **opalinvdisk.exe PhysicalDrive0**

If the necessary prerequisites are fulfilled, **RevertSP** is started on the hard drive specified in **<TargetDevice>**. If the prerequisites are not fulfilled or the hard drive does not support **RevertSP**, an error message is displayed.

7 Technical support

You can find technical support for Sophos products in any of these ways:

- Visit the SophosTalk forum at <http://community.sophos.com/> and search for other users who are experiencing the same problem.
- Visit the Sophos support knowledgebase at <http://www.sophos.com/support/>
- Download the product documentation at <http://www.sophos.com/support/docs/>
- Send an email to support@sophos.com, including your Sophos software version number(s), operating system(s) and patch level(s), and the text of any error messages.

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