

**The Standby Recovery Server Option
with Sybase System 10.0.2 and
Microsoft Windows NT 3.51**

White Paper

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***The Standby Recovery Server Option with Sybase System 10.0.2 and
Microsoft Windows NT 3.51***

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The Standby Recovery Server Option with Sybase System 10.0.2 and Microsoft Windows NT 3.51

Introduction

The purpose of this document is to share the knowledge acquired by Compaq Systems Engineers in the implementation of the Compaq Standby Recovery Server Option with Sybase System 10.0.2 and Microsoft Windows NT 3.51. This document outlines the functions of the Standby Recovery Server Option as well as setup recommendations and implementation information.

Standby Recovery Server Option

The Standby Recovery Server Option increases systems availability for the Sybase System 10.0.2 and Microsoft Windows NT 3.51 environment by automating the process for detecting and replacing a failed server. The Standby Recovery Server allows one Compaq ProLiant server to act as a standby for another.

How the Standby Recovery Server Option Works

The Standby Recovery Server Option requires two identically configured Compaq ProLiant servers connected by SCSI cables to a common set of ProLiant Storage Systems that holds a single copy of Microsoft Windows NT 3.51, Sybase System 10.0.2, and the Sybase database(s). The primary and recovery servers are linked by the Recovery Server Interconnect cable, an RS-232 serial cable with specific pin-out connections for use with the Standby Recovery Server Option. Figure 1 illustrates the configuration.

During normal operation, both servers are physically attached to the network. The primary server supports the network clients while the recovery server is idle.

The recovery server executes a Standby Recovery Server Driver that is contained in the System ROM BIOS. The Recovery Server Driver monitors a periodic heartbeat message transmitted by the Standby Recovery Server Driver on the primary server to the recovery server via the Recovery Server cable. At this point, no operating system is loaded on the recovery server. Therefore, even though the recovery server is electronically attached to the network, it is not currently accessible.

If the recovery server receives the heartbeat message within the configured time-out period, then it assumes that the primary server is functioning normally. The recovery server responds to each heartbeat message with an acknowledgment message across the serial connection. As long as the recovery server receives the heartbeat messages, it will remain idle.

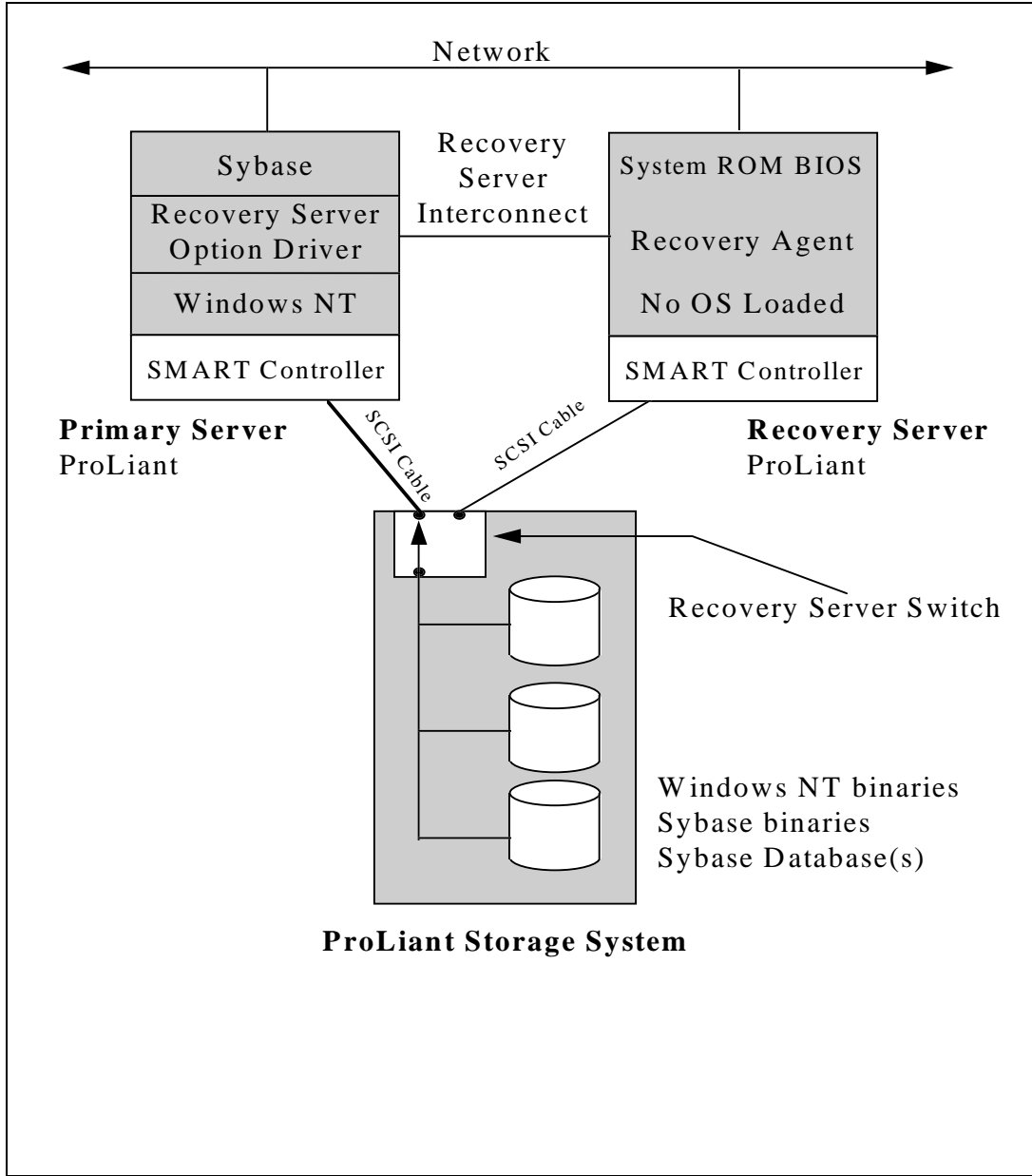


Figure 1: Standby Recovery Server Option - Normal Operation

Switchover Events

When the recovery server does not receive the heartbeat message within the time-out period, the recovery server assumes that the primary server has failed.

The switchover events occur as follows:

1. The Standby Recovery Server Driver in the System ROM BIOS sends commands over the SCSI bus to the Recovery Server Switch installed in the common set of ProLiant Storage Systems. These commands cause the switch to disconnect the storage drives electronically from the primary server and electronically connect them to the recovery server.
2. The recovery server proceeds through a normal boot sequence using the disk storage that was previously attached to the primary server.
3. Since the servers are identically configured, the recovery server assumes the logical network identity that was previously held by the primary server.
4. At this point, the network clients can log on to the recovery server and regain access to the Sybase database.

With the Compaq automated switchover process, the recovery server becomes the active server and is back on-line in a matter of minutes and all without administrator intervention.

Figure 2 illustrates a standby recovery server configuration after the switchover has occurred. The recovery server has assumed all the functions of the primary server. The primary server has completed an Automatic Server Recovery reboot and is waiting to be serviced.

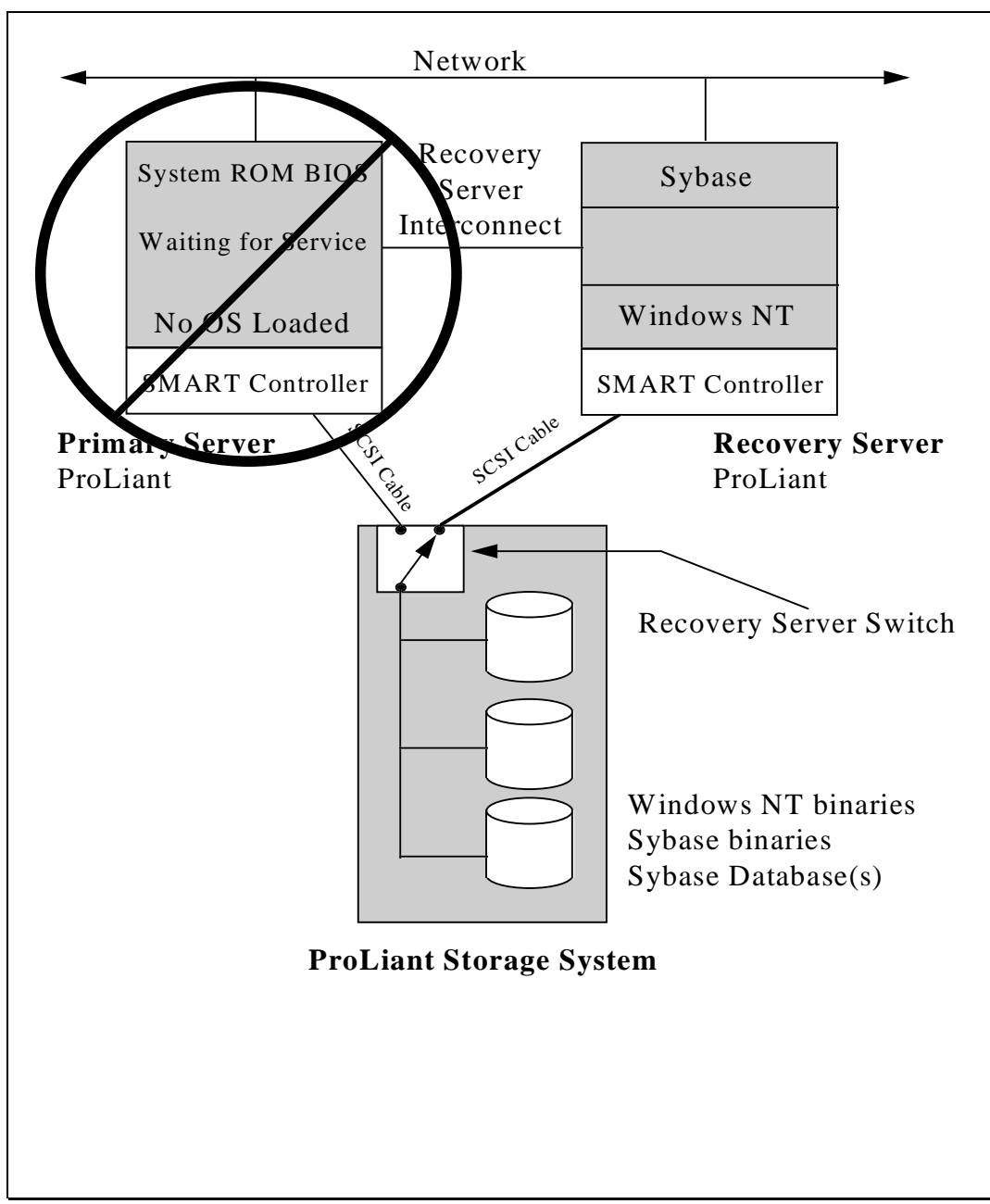


Figure 2: Standby Recovery Server Option - After Switchover

Power Loss to Both Servers

If power is lost to both servers in a Standby Recovery Server configuration, the primary server will *not* boot in an unattended manner when the power is restored. An external power failure of this type will be recorded in the primary server NVRAM as a server failure requiring service, not as a power outage. When the power is restored, the administrator will be prompted to run diagnostics or to press F8 to continue a normal boot sequence. This illustrates the importance of using uninterruptible power supplies.

If the system is unattended when the power is restored, the Recovery Server Driver will time out, electronically switch the storage disks to the recovery server, and boot from the disks because the primary server is not sending the heartbeat message to the recovery server.

Speed of the Switchover

The Standby Recovery Server is designed to minimize the amount of downtime experienced in the event of a server failure. The total time required for the recovery server to assume the function of the primary server is predictable. This time includes the following:

1. The time that elapses from the moment at which a failure occurs in the primary processor to the moment at which that failure manifests itself in the loss of the heartbeat message. This time may vary from mere seconds in the case of a catastrophic failure, such as loss of the processor, or it may be several minutes in the case of some software failures.
2. The defined time-out period that the Standby Recovery Server Driver in the System ROM BIOS will wait for a heartbeat message before proceeding with a switchover is the Automatic Server Recovery (ASR) time-out value. The default value is 10 minutes, but it can be changed to values ranging from 5 minutes to 30 minutes.
3. Once a switchover has been initiated, the time required to initialize the Compaq SMART Array Controller(s) and begin the operating system boot process from the drives, which by this time will be electrically connected to the recovery server.
4. The time required for Microsoft Windows NT to boot. This will be dependent on the size and number of disk drives attached.
5. Once Windows NT is active, the time required for Sybase System 10.0.2 to initialize and recover the database(s).
6. Client log in time.

Servicing and Restoring the Failed Server

Once the recovery server has assumed the function of the failed primary server, it can be detached from the ProLiant Storage System(s) and repaired.

After any required repairs are made, you should restore the original configuration. The recovery server and the ProLiant Storage System(s) must be power cycled in order to reinitialize the Recovery Server Switch. The disk drives will be electrically connected to the primary server and it will boot the operating system. The recovery server can be re-booted and it will return to its role of listening for the heartbeat message from the primary server.

Sybase Server Behavior

Sybase System 10.0.2 functions very well with the Standby Recovery Server Option. After the switchover has occurred, Sybase will automatically recover the database(s) that were open and active at the time of the failure. This maintains the data integrity of the database(s).

Sybase Client Behavior

The client systems attached to the Sybase server will have to reestablish the database connection to the server. Nothing else needs to occur on the client systems.

Hardware Configuration Requirements

The Standby Recovery Server option has several hardware requirements for proper operation. As was mentioned earlier, both the primary and the recovery server must be identically configured. They must have the same memory configurations as well as having the NIC(s) and Compaq SMART Array Controller(s) installed in the same slots. Identical hardware configurations are required to prevent Windows NT or Compaq System configuration problems when a switchover occurs.

The Standby Recovery Server supports the following Compaq servers:

- ProLiant 4500
- ProLiant 4500R
- ProLiant 4000
- ProLiant 4000R
- ProLiant 2000
- ProLiant 2000R
- ProLiant 1500
- ProLiant 1500R

To allow for fully automated switchover, all disk storage must be located externally in a ProLiant Storage System and must be attached to Compaq SMART Array Controllers. No internal disk storage can be used on either the primary or the recovery server. Each ProLiant Storage System must have the Recovery Server Option Kit installed. This kit consists of an electronic switch that is installed into the ProLiant Storage System(s) to enable the switchover process. The table below outlines which ProLiant Storage Systems are supported.

North American Part Number	International Part Number	Chassis	Interface	Supported by Recovery Server Option
146700	146750	Tower	Fast SCSI-2	No
197100	197150	Tower	Fast SCSI-2	Yes
189600	189640	Tower	Fast/Wide SCSI-2	Yes
163750	163755	Rack-Mountable	Fast SCSI-2	Yes
189900	189905	Rack-Mountable	Fast/Wide SCSI-2	Yes

Table 1: Compaq ProLiant Storage Systems

System Configuration Requirements

The following is a list of system configuration settings for the Standby Recovery Server Option. For a more detailed discussion of these settings as well as actual hardware installation, refer to *The Recovery Server Option Users Guide*.

- Compaq System Configuration Utility should be version 2.28 or higher
- System ROM should be dated 7/20/95 or newer
- SMART Array SCSI Controller Firmware should be at version 2.22 or higher
- Compaq Windows NT SSD version 1.16 or higher

Primary Server System Configuration

The following system configuration parameters must be set in the primary server:

- Automatic Server Recovery Option
 - **Software Error Recovery** must be **ENABLED**
 - **Software Error Recovery Time-Out** is user definable from 5 minutes to 30 minutes
 - **Recovery Server Option** must be set to **PRIMARY SERVER**
 - **Recovery Server Port** set to either **COM1** or **COM2** depending on which port the Recovery Server Interconnect cable is attached to
 - **Software Error Recovery Boot Option** should be set to **BOOT OPERATING SYSTEM**
- SMART Array Controller(s)
 - **On-line Recovery Server Status** must be **DISABLED**
 - **On-line Recovery Server Type** must be set to **Unswitchable**
 - **Array Accelerator Status** on all logical drives must be **DISABLED**

Recovery Server System Configuration

The following system configuration parameters must be set in the recovery server:

- Automatic Server Recovery Option
 - **Software Error Recovery** must be **ENABLED**
 - **Software Error Recovery Time-Out** is user definable from 5 minutes to 30 minutes
 - **Recovery Server Option** must be set to **STANDBY SERVER**
 - **Recovery Server Port** set to either **COM1** or **COM2** depending on which port the Recovery Server Interconnect cable is attached to
 - **Software Error Recovery Boot Option** should be set to **BOOT OPERATING SYSTEM**
- SMART Array Controller(s)
 - **On-line Recovery Server Status** must be **DISABLED**
 - **On-line Recovery Server Type** must be set to **Unswitchable**
 - **Array Accelerator Status** on all logical drives must be **DISABLED**

Software Configuration Requirements

There are several software configuration changes that need to be made to the base Windows NT system as well as the Sybase server to allow fully automatic and timely recovery.

Windows NT Server Software Configuration

To configure Windows NT to start the Compaq Standby Recovery Agent automatically, follow these steps:

1. Start Microsoft Windows NT (if you have not already done so).
2. Double-click on the *Main* group icon.
3. Double-click on the *Control Panel* icon.
4. Double-click on the *Services* icon.
5. Select **Compaq Standby Recovery Agent** from the services list and click on the *Startup* button.
6. Select **Automatic** and then choose *OK*.
7. Close *Services*.
8. Close *Control Panel*.

You should also change the default startup time for Windows NT from its default of 30 seconds. This will allow the system to startup faster. To change the default startup time, follow these steps:

1. Start Microsoft Windows NT (if you have not already done so).
2. Double-click on the *Main* group icon.
3. Double-click on the *Control Panel* icon.
4. Double-click on the *System* icon.
5. In the Operating System section, change the **Show List for xx Seconds** field to **5 seconds** then choose OK.
6. Close *Control Panel*.

Sybase SQL Server Configuration

The Sybase SQL Server should be enabled to start automatically when the Windows NT system starts. This will provide for a fully automatic start of Sybase in the event of a switchover. The following steps outline how to configure Sybase SQL Server to start automatically:

1. Start Microsoft Windows NT (if you have not already done so).
2. Double-click on the *Main* group icon.
3. Double-click on the *Control Panel* icon.
4. Double-click on the *Services* icon.
5. Select **Sybase SQLServer** from the services list and click on the *Startup* button.
6. Select **Automatic** and then choose *OK*.
7. Close *Services*.
8. Close *Control Panel*.

Refer to the Sybase System Administration Guide Supplement for Microsoft Windows NT for more information.

Appendix

System Requirements

System Component	Requirement	Installation Notes
Recovery Server Option Kit	One for each ProLiant Storage System used.	See The Recovery Server Option Users Guide for the contents of this kit and installation instructions.
Servers	Two each of one of these models: ProLiant 4500, 4500R, 4000, 4000R, 2000, 2000R, 1500, 1500R.	The two servers must have identical hardware configurations.
SMART Array Controllers	Each SMART Array Controller can support up to two ProLiant Storage Systems.	The Array Accelerator on the SMART Array controllers must be disabled.
Internal Hard Drives	None supported.	For internal CD-ROM and tape drives, integrated controllers may be used.
COM Port	One serial port, COM Port 1 or 2, on each server for communications between primary and recovery servers.	The same COM port must be used on both the primary and the recovery servers.
External SCSI Cables	One standard-to-wide cable required to connect each primary server and each recovery server to each ProLiant Storage System.	See Appendix B in The Recovery Server Option Users Guide for cabling requirements.
External Disk Storage	Any ProLiant Storage System except Compaq part number 146700 (international part number 146750). Refer to Table 1 for more information.	All disk storage must be located in an external unit. Each external storage unit must have one Recovery Server Switch installed.

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