Device polling issues in a SAN

Remark: As they behave identical the name NSR is used for both NSR and IFC in this document.

Polling is the behavior of a service that interrogates a tape drive and/or library controller via the IFC[i] or NSR[ii] on a regular base, with all kinds of SCSI[iii] commands.
This can seriously disturb a backup in one or more of the following ways since the NSR has to handle a lot of additional commands not coming from your Backup utility.

- Ø This can severely impact the backup speed.
- Ø It can even result in I/O-errors.
- Ø The Backup utility deciding to mark your tapes to "POOR".
- Ø Put the tape drive offline.
- Ø The throughput may drop dramatically.
- Ø The drive(s) may operate in Start/Stop mode as they don't get enough data to keep it in streaming mode. This could increase wear and tear for DLT and SDLT drives and media.

There are a number of known disturbing services:

- – Network scanners
- – on Windows systems
    - o RSM polling
    - o tape driver polling (i.e. hplto.sys and hpdltw32.sys)
- – On HP-UX systems
    - o OVSAM hostagents may play a role when combined with older Tachyon Fibre Channel drivers. In this case you have to install the latest Tachyon driver patches.
- – On various systems (Windows / Tru64 / HP-UX)
    - o Insight Management agents (CIM or SIM)
- – On Macintosh systems
    - o Retrospect® installs a monitor and control program at system boot called RetroRun™.
    - o This "daemon" is constantly polling the state of your tape hardware and can cause major grief.

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[i] IFC   Interface Controller, part of the Extended Tape Library Architecture
[ii] NSR   Network Storage Router
Both units route data coming from an incoming Fibre connection to an outgoing SCSI- or FC-connections   and back.
[iii] SCSI Small Computer Systems Interface

IMPORTANT:

Polling has to be disabled on ALL servers that can "see" the tape drives in your library through the SAN!!!!

Servers which do not have to communicate with the tape drives, have to be put into a different zone on the SAN switches, having no access to tape drives.
You can additionally create a separate map inside the NSR for the Backup Servers and make the Indexed map empty. An empty "indexed" map prevents new/unknown systems being able to gain access to the tape drives.

Network scanners

Network scanners like "NMAP" from Nessus can also disturb the backup via the LAN and the NSR will get mixed up and will sometimes reboot spontaneously.

Schedule a network scan always outside the backup window or be sure it cannot see the tape library.
We have also seen **3com Network Director** causing NSR panics.

Any application issuing SNMP tree walks during backups may cause failures.

RSM (Removable Storage Manager) polling

One of the Windows backup-components is sending TUR (Test Unit Ready) commands, to all drives   Windows 2003 every second
        Windows 2000 uses a 3 second interval.

RSM standard enables polling after the installation of Windows has been completed.

You can use the tips of the Microsoft article mentioned at the end of this document for disabling RSM polling.

Tape driver polling

Be aware that some backup applications you do not use the default tape drivers but have their own drivers.

Remark: If a registry-entry for a driver exist, you should modify the Autorun entry to prevent problems when you change tapedrive models

Ultrium or LTO-drives.

The AutoRun parameter does not have to exist, it depends of the driver version.

The hplto.sys driver version 1.0.4.0 has no "AutoRun" entry in the Registry key, so you have to add this entry once:
1. Click Start, click Run, type regedit, and then click OK
2. Search under \HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\hplto
3. right-click the subkey hplto
4. Point to New, and then click DWORD Value.
    a. Type AutoRun as the entry name, and then press ENTER.
    b. If REG_DWORD=1 in this AutoRun entry then:
        i. Right-click AutoRun, and then click Modify.
        ii. In the Value data box, type a value of 0 to turn off the AutoRun feature and press OK

Do not use the hplto.sys driver version 1.0.3.1 because this driver turns polling on again when you do not expect it (after a reboot of the server or even after a power cycle of your library), because this version has an autorun=1 setting in the .inf file.

Changing that setting to 0 will mark the driver unsigned.

Only use version 1.0.3.0, an older, or a newer version.

Version 1.0.3.0 is also OK but cannot be used to overwrite version 1.0.3.1 when the latter has been installed by accident.

Do NOT forget to reboot the Windows server after changing the Registry!
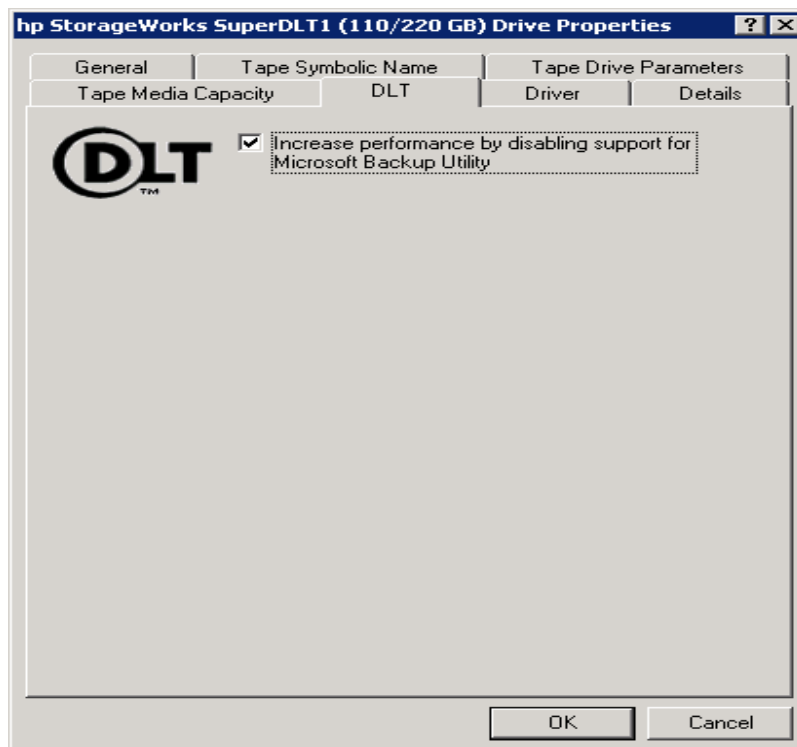
Also a reboot of the NSR may be necessary to flush the buffers.

DLT or SDLT tapedrives.

For the hpdltw32.sys driver you have to add the AutoRun entry in the Registry key (if it is not there) :

1. Click Start, click Run, type regedit, and then click OK
2. Search under \HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\hpdltw32]
3. AutoRun REG_DWORD=0

Or modify the driver options, from the device manager

1. Mark the "Increase performance ... "

   This will enter a REG_MULTI_SZ (Multi-String) value named "AutoRunAlwaysDisable" of the vendor string reported by the drive e.g. COMPAQ SuperDLT1 for registry key HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\hpdltw32

2. Repeat this step for each SDLT tape drive.

Do NOT forget to reboot the Windows server after changing the Registry!
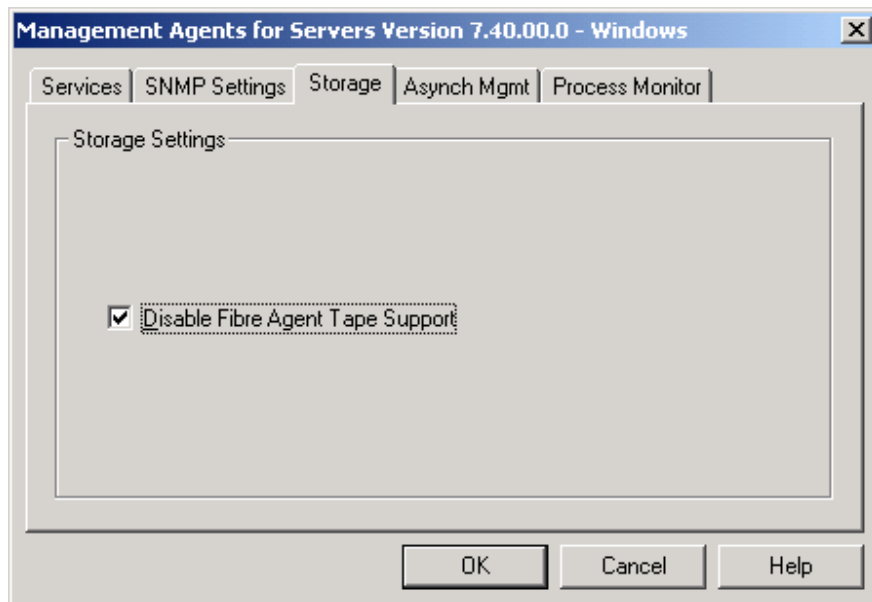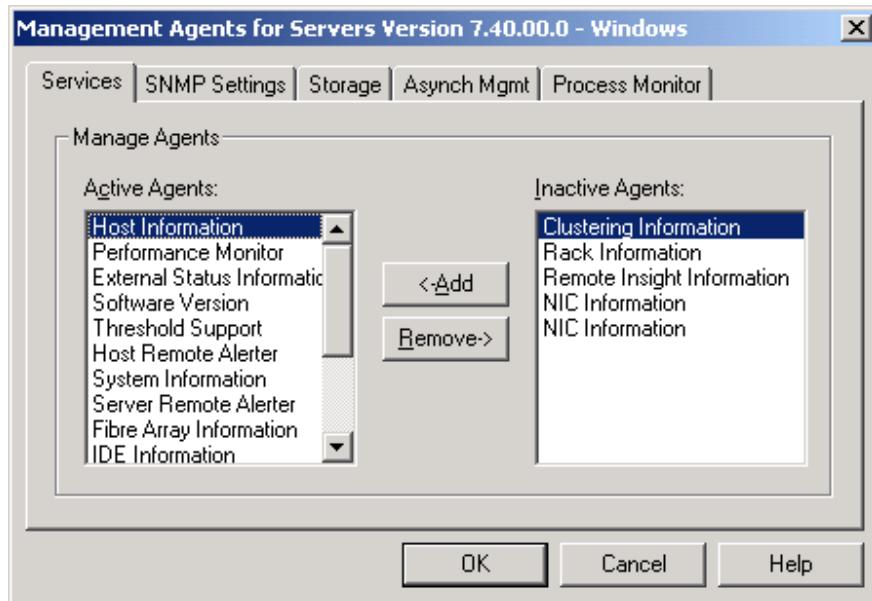
Also a reboot of the NSR may be necessary to flush the buffers.

Insight Management Agents (CIM)

The Insight Management Agents send Inquiry-commands to the drives to detect failures, at regular intervals.

You could check your Windows systems to see if the "Disable Fibre Agent Tape Support" is checked:

Start -> Control Panel -> HP Management Agents :

Disabling of the management agents "Fibre" module for version 5.x and 6.x has to be done manually.

However Management agents 5.x and 6.x should be upgraded so the tool can be used to quiry/disable the fibre agent.

For the 7.x version you can use the tool TapeOff.exe (see info about the SP25792.zip at the end of this document) for showing and disabling the service.

Especially the management agents of version 5.x and 6.x are very aggressive but also the 7.x version can lead to failing backups.

Example:
D:\TAPE\cim-rsm-ovsam\CIM>tapeoff

HP Fibre Agent Tape Disable Utility - Version 1.00
(C) Copyright 1997,2004 Hewlett-Packard Development Company, L.P.

Syntax error, not enough arguments.
Usage:
  TapeOff [options]

    options
      /?   Help - shows this message
      /c   Show current value of Fibre agent tape support
      /d   Disable Fibre agent tape support
      /e   Enable Fibre agent tape support
      /q   Quiet operation - no prompt for verification

Use "TapeOff /c" to check if polling of the Fibre Agent is on.
Use "TapeOff /d /q" to disable Fibre agent tape support.

How to verify if polling is active.

After performing the previously described steps in this document you can verify if the polling is still active in two ways.

Remark: Some backup applications, like Backup Exec, are also sending commands on a regular base in its idle periods, so without a running backup or restore, you should stop them before this check!

A fast way to see if polling has stopped, you can
- Login to your NSR via the LAN by typing the IP address in your web browser (default root/password).
- You can then "Clear Current Traces" from the "Utilities" menu
- Look in the "Current Traces" menu.
    o This should stay empty when there is no activity on the NSR (So no backup is running at that moment).
    o If polling is still active you will see that immediately as the Current Trace is filling up rapidly!!.

Another method is to retrieve the report of the NSR and decode the various trace paragraphs.

This decoding however takes time and is only a snapshot in time.

The buffer of the NSR can contain, depending on the model, ~100 - ~200 commands and a running backup will overwrite the logging in a few seconds.

Keep in mind that some polling will still occur, for instance an HP-UX ioscan or Windows "scan for hardware changes" will also cause events to happen. Besides the operating system and backup application L&TT can perform some polling during its scan and execution.

"Offline" or 'not seen' tape drives

A remark about getting "Offline" tape drives or tape drives not seen by the library controller.

This can happen when a tape library is being turned off and on while there is still a tape in a drive.

What is happening during a backup or restore?

First the backup-application will send a "Prevent Media Removal"-command to the drive.
Secondly the data (label) is read from the media and the data transfer will start.
Finally the backup-application will send the "Allow Media Removal"-command to the drive.

When this last action could not be completed stays the tape in the drive, as the drive refuses to unload the tape.

When power is enabled to a drive with inserted media, the drive first has to rewind the media in a very secure way before it goes to ready status.

- The drive does not know how much tape is on the reel in the drive.
- After the rewind the drive continues with an extended selftest, writing and reading data on specific locations on the tape.

At power-on the NSR completes its selftest much faster, typically 60 seconds, than the tape drive with a tape inside. A drive with a tape loaded can easily take about 15 minutes to get ready.
At that point the NSR will not detect the drive + eventually the library controller and another reboot of the NSR will be needed after the drive has completed its selftest!.

Stuck tapes are often a result of an Abort of the Backup application (often due to polling), which sometimes keep the tape "locked" inside the drive.
The "eject" button does not work at that moment.
And/or an error message is displayed :

MSL5/6000:   200F Removal Prevented (Receive medium prevent removal from drive for a fetch.)

ESL9000/   MEDIUM REMOVAL PREVENTED
ESL E   Prevent Medium Removal command was executed and command was received to export
                cartridge. Retry move command using your application software.

EML   6447=TTI_RESULT_PREVENT_MEDIA_REMOVAL
                The Drive reported prevent media removal set

An "Unload" command from that same Backup application may be necessary to "unlock" the tape.

If that does not help, you just have to power-cycle the drive.

More information

More information can be found in various documents:

The latest hplto.sys driver 1.0.4.0 can be found on the web:
http://h20000.www2.hp.com/bizsupport/TechSupport/SoftwareIndex.jsp?lang=en&cc=us&prodNameId=443368&prodTypeId=12169&prodSeriesId=443365&swLang=13&taskId=135&swEnvOID=1005   (combine these lines in a single line for your browser)

More info on tape drive performance and troubleshooting see:

http://h20000.www2.hp.com/bizsupport/TechSupport/Document.jsp?objectID=lpg50460

Removable Storage Manager (RSM) in Windows Server 2003 is not Disabling Properly Which Causes Performance Issues in Enterprise Backup Solutions (EBS).

Source	customer advisory OT040301_CW01 revision 2 released July 2004
Description:	Many of the ISV Backup Applications supported by HP request or require that the RSM service be disabled. When the Windows 2003 server is rebooted, even though RSM is disabled, it will continue to initiate the Test Unit Ready (TUR) SCSI command indefinitely on all removable devices attached. This can cause issues with performance in an environment with many shared tape devices.
Solution	Please refer to *Microsoft Knowledge Base Article 842411* for instructions on how to workaround this problem : http://support.microsoft.com/default.aspx?scid=kb;en-us;842411

The chapter "Windows 2000/2003 known issues" in the EBS design guide.

Tips regarding mappings in the NSR the EBS design guide.

http://h18000.www1.hp.com/products/storageworks/ebs/ebs123-2.html

For more information see the chapter "Management agents" in the "Enterprise Backup Solution (EBS) design guide

http://h18000.www1.hp.com/products/storageworks/ebs/

Tape Backup In StorageWorks Enterprise Backup Solution (EBS) Environment
From ProLiant Server May Not Complete If Insight Management Storage Agents

Source	customer advisory ES040611_CW01 revision: 0 released 13 August 2004

Description   When running tape backups in an Enterprise Backup Solution (EBS) environment on a ProLiant server with the Insight Management Storage Agents for Windows loaded, the backup jobs may not complete. Before this occurs, several *Event ID 9*, *Event ID 11* or *Event ID 51* error messages may be posted to the Windows NT Event log and the Storage Area Network (SAN) may become unstable.

Note: I/O activity from the server to other SAN devices may stop when this occurs.

Resolution   This will be resolved in a future version of the HP Insight Management Storage Agents for Windows, which will allow the tape backup to complete. This advisory will be updated when more information becomes available.

Until the updated Storage Agents become available, the HP Utility for Disabling Fibre Agent Tape Support can be used to allow these backup jobs to complete.

This utility disables the Fibre Agent Tape support, which disables the monitoring of the Fibre Attached Tape Library.

Deploying this utility will disable only Fibre Attached Tape Library monitoring, leaving the monitoring of all other devices and peripherals by the Storage Agents unaffected.

The HP Utility for Disabling Fibre Agent Tape Support is available in SoftPaq SP25792 at the following URL:

<ftp://ftp.compaq.com/pub/softpaq/sp25501-26000/SP25792.EXE>

The text file for SP25792 is available:

<ftp://ftp.compaq.com/pub/softpaq/sp25501-26000/SP25792.TXT>