HP MSA2000 Family MPIO DSM installation guide

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Legal and notice information

Installing the HP MSA2000 Family MPIO DSM

Multipathing solutions, such as the Microsoft Multipath Input/Output (MPIO) solution, are designed to provide failover protection through the use of redundant physical path components (cables, adapters, and switches) between the server and the storage device. Multipathing also permits the redistribution of the read/write load among multiple paths, reducing bottlenecks and balancing work loads. The Microsoft MPIO solution works in conjunction with the HP device-specific module (DSM) to provide a high-performance solution that keeps the data stored on your Modular Storage Array (MSA) highly available. The MSA2000 Family MPIO DSM includes drivers and utilities for managing multipathing on your array. It supports up to 128 devices and up to 32 paths per storage unit (LUN).

Note – The MSA2000 Family MPIO DSM does not apply to the 2012i Modular Smart Array. The Microsoft Software Initiator software includes the MPIO DSM that is required for iSCSI. However, both DSMs can be installed on one server.

Once the DSM is installed, *no further configuration is required*. However, this document includes information about using the MPIO command-line utility for advanced users who might want to change existing parameters.

Installation Requirements

The MPIO DSM requires the following software:

- Windows 2003 Server (Service Pack 1) or Windows 2003 R2

Microsoft MPIO Driver Subsystem Known Issues

The Microsoft MPIO Driver Subsystem is installed along with the MPIO DSM. The following are known Microsoft issues regarding its MPIO Driver Subsystem:

- During MPIO installation, the call to `UpdateDriverForPlugAndPlayDevices` restarts the disk stacks. However, if MPIO is being installed on a system with mirrored disks, the disks appear as "failed redundancy." This happens only if disk management applications (that use the `dmaadmin` service) are running at the time of MPIO installation. Close all disk management applications (including but not limited to, `diskmgmt.msc` and `diskpart.exe`) prior to installing MPIO. To prevent the mirrored disks from showing up as "failed redundancy," ensure that the `dmaadmin service` is not running at the time of MPIO installation.
- Other port filter drivers might interfere with the proper function of MPIO solutions. Microsoft does not recommend the use of these drivers.

Downloading the MSA2000 Family MPIO DSM

Download the MSA2000 Family MPIO DSM software bundle from `http://www.hp.com/go/msa`. Select MSA SAN Arrays, select your product, and go to Related products.

Installing the MPIO Drivers and Utilities

To use the MPIO DSM, you must first install the drivers and utilities.

Note – If you are upgrading the MPIO DSM, you do not have to uninstall the existing module.

Note – The time it takes to complete MPIO DSM installation, initial scan, and detection of devices depends on the complexity of the system configuration, the number of LUNs, and the number of devices connected to the host. Some operations can take several seconds per LUN per path.

1. Double-click the `msa2000-mpio-dsm` folder, which is created after you unzip the MPIO DSM software bundle you downloaded.
2. Double-click or run `Setup.exe`.
3. From the Welcome dialog, click Next.
4. Read the copyright and license information and click Yes to continue.
5. From the Choose Destination Location dialog, install to the default folder and click Next.

   The drivers are installed in:

   `C:\Program Files\Hewlett-Packard\HP MPIO DSM\MSA2000`

   Overwriting MPIO Drivers and Utilities

   The Microsoft MPIO Driver Subsystem is installed along with the DSM. The install program checks for an existing MPIO Driver Subsystem, specifically for the installation of three Microsoft drivers (`mpio.sys`, `mpdev.sys`, and `mpspfltr.sys`). If a previous version of any of these drivers has already been installed on the system, you may be prompted to choose whether to overwrite the existing drivers with the ones supplied by the MPIO DSM package.
6. From the Information dialog, click OK to continue.

   The MPO DSM is installed, and if necessary, the drivers are installed.

   The installer program displays a splash screen showing its progress, which automatically closes after the drivers are installed.
7. The Wizard Complete dialog is displayed and if required, you are prompted to reboot your computer to complete the setup.

Using the dsmcli Command-Line Utility

The DSM command-line interface enables you to display or change devices, paths, and load balance policies, and enables you to diagnose and troubleshoot the DSM.

To run dsmcli from the Windows Start menu, click Start > All Programs Hewlett-Packard >MSA2000 > MPIO Configuration.

To run dsmcli from the command-line prompt, open a command line window, navigate to the directory in which the MPIO DSM was installed (C:\Program Files\Hewlett-Packard\HP MPIO DSM\MSA2000 by default), and enter the following command:

```
dsmcli
```

The dsmcli> command line prompt is displayed. From the dsmcli> prompt, the following commands are available:

- clear
- devinfo
- help
- pathinfo
- policies
- primary
- weight
- mpiolist
- pgr

The help command displays a help file with available dsmcli command options.

clear

The clear command clears the performance counters. Performance counter information (for example, BytesRead, BytesWritten, NumberReads, and NumberWrites) can be viewed by executing the pathinfo command, which is explained in “pathinfo” on page 9.

```
dsmcli> clear

 Clear all counters: OK
```

devinfo

The `devinfo` command displays device information or enables you to change the load balance policy for the specified device.

```
devinfo [ SerialNumber | all ][ policy | {failback-on | failback-off}]
```

where:

- *SerialNumber* is the serial number of the device and *policy* is the load balance policy that you want to use for the specified device. See "`policies`" on page 11 for a list of currently supported load balance policies.
- *all policy* sets the load balance policy of all devices.
- *SerialNumber {failback on | failback off}* sets the failback status of the specified device.
- *all {failback-on | failback off}* sets the failback status of all devices.

  The failback feature is only valid when the load balance mode is `FailOver`. You can enable or disable the failback feature for a device. By default, failback is enabled when the device is in `FailOver` mode.`elp`.

Example

```
dsmcli> dev

 Device# SerialNumber Policy            nPaths  FailBack
 ---------------------------------------------------------
 0       9B68DE12-01  RoundRobin        2       N/A
 1       AF68DE12-01  RoundRobin        2       N/A
 2       EB3FDE12-01  RoundRobin        2       N/A
 3       1A69DE12-01  RoundRobin        2       N/A
 4       3869DE12-01  RoundRobin        2       N/A

dsmcli> dev 9B68DE12-01 failover
dsmcli> dev

 Device# SerialNumber Policy            nPaths  FailBack
 ---------------------------------------------------------
 0       9B68DE12-01  FailOver          2       failback-off
 1       AF68DE12-01  RoundRobin        2       N/A
 2       EB3FDE12-01  RoundRobin        2       N/A
 3       1A69DE12-01  RoundRobin        2       N/A
 4       3869DE12-01  RoundRobin        2       N/A

dsmcli> dev 9B68DE12-01 failback-on
dsmcli> dev

 Device# SerialNumber Policy            nPaths  FailBack
 ---------------------------------------------------------
 0       9B68DE12-01  FailOver          2       failback-on
 1       AF68DE12-01  RoundRobin        2       N/A
 2       EB3FDE12-01  RoundRobin        2       N/A
 3       1A69DE12-01  RoundRobin        2       N/A
 4       3869DE12-01  RoundRobin        2       N/A
```

```
dsmcli> dev all Weighted
dsmcli> dev

 Device# SerialNumber Policy            nPaths  FailBack
 ---------------------------------------------------------
 0       9B68DE12-01  Weighted          2       N/A
 1       AF68DE12-01  Weighted          2       N/A
 2       EB3FDE12-01  Weighted          2       N/A
 3       1A69DE12-01  Weighted          2       N/A
 4       3869DE12-01  Weighted          2       N/A
```

pathinfo

The `pathinfo` command displays path information or enables you to change the status of the path.

To display information about all paths, run the following command:

```
pathinfo
```

`HbaWWPN` (initiator's ID) and `CtrlPortWWPN` (controller port's ID) are the two end points of a path.

To display information about a specific path, specify the serial number or the worldwide port name (WWPN) of the HBA:

```
pathinfo [ SN serial_number | HBA HBA_wwpn ]
```

where *serial_number* is the serial number of the path and *HBA_wwpn* is the worldwide port name of the HBA.

The status of the path can be set to `online`, `standby`, or `failed`:

```
pathinfo HBA_wwpn [ online | standby | failed ]
```

where *HBA_wwpn* is the worldwide port name of the HBA.

- `Online` – The path is active and can perform the I/O operation.

  `Primary: True` = active.
- `Standby` – The path will perform the I/O operation if the active path fails.

  `Primary: False` = standby
- `Failed` – You can fail the path to simulate the physical error.

Example

```
dsmcli> pathinfo sn AF68DE12-01

 Policy:         RoundRobin
 SerialNumber:   AF68DE12-01
 PathId:         02010102
 Weight:         0
 Primary:        false
 ScsiAddress:    02000102
 HbaWWPN:        10000000C92F464E
 CtrlPortWWPN:   217000C0FF0A4052
 State:          Online
 BytesRead:      177152
 BytesWritten:   36864
 NumberReads:    46
 NumberWrites:   9
```

```
dsmcli> pathinfo 10000000C930E202 standby
dsmcli> pathinfo

 Policy:         RoundRobin
 SerialNumber:   9B68DE12-01
 PathId:         03010001
 Weight:         0
 Primary:        false
 ScsiAddress:    03000001
 HbaWWPN:        10000000C930E202
 CtrlPortWWPN:   217000C0FF0A4052
 State:          Standby
 BytesRead:      184832
 BytesWritten:   90112
 NumberReads:    51
 NumberWrites:   21
```

policies

The `policies` command displays the currently supported load balance policies. Each LUN can have its own load balance policy. Possible values include the following:

- `FailOver` – No load balancing is performed. There is a single active path and the rest of the paths are standby paths. The active path is used for sending all I/O. If the active path fails then one of the standby paths is used.
- `RoundRobin` (default) – All paths are active paths. They are used for sending I/O in a round-robin fashion.
- `Dynlqd` – Uses the path with the least number of active requests.
- `Weighted` – Each path is assigned a weight and I/O is sent on the path with the lowest weight. If the path with the lowest weight fails, then the path with the next lowest weight is used.
- `LeastBlocks` – Uses the path with the fewest pending I/O blocks.

See "`devinfo`" on page 7 for information on changing the policy.

Note – In a cluster environment, no load balancing is performed and the policy is set to `FailOver`. If you are not using cluster software, you can enable a load balance policy to distribute I/O to all paths.

Example

```
dsmcli> policies

 FailOver
 RoundRobin
 Dynlqd
 Weighted
 LeastBlocks
```

primary

The `primary` command sets the primary path to the specified path ID.

```
primary pathID
```

where *pathID* is the new primary path ID.

Example

In the following example, before executing the command, `primary 02010104`, `Primary` is shown as `false`; after running the command, `Primary` is shown as `true`.

```
dsmcli> primary 02010104
dsmcli> pathinfo

 Policy:         FailOver
 SerialNumber:   EB3FDE12-01
 PathId:         02010104
 Weight:         0
 Primary:        true
 ScsiAddress:    02000104
 HbaWWPN:        10000000C92F464E
 CtrlPortWWPN:   217000C0FF0A4052
 State:          Online
 BytesRead:      193536
 BytesWritten:   1871360
 NumberReads:    93
 NumberWrites:   1752
```

weight

The `weight` command sets the weight of the specified path. I/O is sent to the path with the lowest weight. If that path fails, I/O is sent to the path with the next lowest weight, and so on.

```
weight pathID weight
```

where *pathID* is the specified path ID and *weight* is the assigned weight. The recommended weight range is 0–100.

Note – The `weight` command is valid only when the `weighted` load balance policy is available (see “`policies`” on page 11 for the list of currently supported load balance policies).

Example

```
dsmcli> weight 03010104 10
dsmcli> dev

 Device# SerialNumber Policy            nPaths  FailBack
 ------------------------------------------------------------
 0       9B68DE12-01  Weighted          2       N/A
 1       AF68DE12-01  Weighted          2       N/A
 2       EB3FDE12-01  Weighted          2       N/A
 3       1A69DE12-01  Weighted          2       N/A
 4       3869DE12-01  Weighted          2       N/A

dsmcli> pathinfo

 Policy:        Weighted
 SerialNumber:  3869DE12-01
 PathId:        03010104
 Weight:        10
 Primary:       false
 ScsiAddress:   03000104
 HbaWWPN:       10000000C930E202
 CtrlPortWWPN:  207800C0FF0A4052
 State:         Online
 BytesRead:     196608
 BytesWritten:  87552
 NumberReads:   55
 NumberWrites:  23
```

mpiolist

The `mpiolist` command displays specified MPIO WMI objects. It shows the information of the local host only.

```
mpiolist WMI_object [machine_name]
```

where:

- *WMI_object* is either the name of a WMI or object or one of the types (digit 0–5) described in the following table:

`mpiolist` **Option**	**Parameter**
0	MSDisk_Driver_Performance
1	MPIO_DISK_INFO
2	MPIO_PATH_INFORMATION
3	MPIO_CONTROLLER_CONFIGURATION
4	MPIO_TIMERS_COUNTERS
5	MPIO_GET_DESCRIPTOR

- *machine_name* is an optional parameter specifying the computer to be queried.

Example

```
dsmcli> mpiolist 1
  <ROOT\wmi>
    MPIO_DISK_INFO
      InstanceName* = "Root\MPIO\0000_0"
      NumberDrives = 0x5
      DriveInfo =
        instance of MPIO_DRIVE_INFO {
          NumberPaths = 0x2
          Name = "MPIO Disk0"
          SerialNumber = "60CFF00E50321A69DE121000"
       DsmName = "StorageWorks HPMSA2000 Family Multi-Path Device
Specific Module"
         }
        instance of MPIO_DRIVE_INFO {
          NumberPaths = 0x2
          Name = "MPIO Disk1"
          SerialNumber = "60CFF00E50323869DE121000"
         DsmName = "StorageWorks MSA2000 Family Multi-Path Device
Specific Module"
         }
        instance of MPIO_DRIVE_INFO {
          NumberPaths = 0x2
          Name = "MPIO Disk2"
          SerialNumber = "60CFF00E50419B68DE121000"
         DsmName = "StorageWorks MSA2000 Family Multi-Path Device
Specific Module"
         }
        instance of MPIO_DRIVE_INFO {
          NumberPaths = 0x2
          Name = "MPIO Disk3"
          SerialNumber = "60CFF00E5041AF68DE121000"
         DsmName = "StorageWorks MSA2000 Family Multi-Path Device
Specific Module"
         }
        instance of MPIO_DRIVE_INFO {
          NumberPaths = 0x2
          Name = "MPIO Disk4"
          SerialNumber = "60CFF00E5041EB3FDE121000"
         DsmName = "StorageWorks MSA2000 Family Multi-Path Device
Specific Module”
         }
```

pgr

Used for diagnostic and troubleshooting purposes only, the `pgr` (Persistent Group Reservations) command enables you to determine whether the DSM is currently using SCSI-2 Reserve and Release commands or SCSI-3 Persistent commands. It also enables you to specify which commands the DSM is to use.

Typically, SCSI Reserve and Release commands are used in clustered environments where it is necessary to limit access to a target device to only one host at a time. Persistent Reservation refers to a set of SCSI-3 commands that replace the original Reserve and Release commands with a more sophisticated mechanism that provides better support for SAN and multipath configurations.

The `pgr` command shows whether the DSM is currently using SCSI-3 Persistent commands and the PGR key. If the `pgr` command is enabled, the DSM uses SCSI-3 Persistent commands. If the command is disabled, the DSM uses SCSI-2 Reserve and Release commands to reserve and release volumes on behalf of clustering software. The key is used to identify the host.

```
dsmcli> pgr
Persistent Reservation: Enable
                   Key: T-W2K3-H
```

The `pgr` command also enables you to specify which commands the DSM is to use. The change is not active until the system is rebooted.

```
pgr [ enable | disable ]
```

where:

- `enable` specifies that the DSM use SCSI-3 Persistent commands
- `disable` specifies that the DSM use SCSI-2 Reserve and Release commands

`pgr list`

The `pgr list` command displays the current persistent reservation status for all disk drives as seen by the current host. This information is used by service technicians when troubleshooting a problem.

Example

```
dsmcli> pgr list
\\.\PhysicalDrive1 registered keys:
00 00 00 38 00 00 00 10 54 2D 57 32 4B 33 2D 48 ...8....T-W2K3-H
54 2D 57 32 4B 33 2D 48                         T-W2K3-H
\\.\PhysicalDrive1 reservations:
00 00 00 38 00 00 00 00                         ...8....
\\.\PhysicalDrive2 registered keys:
00 00 00 38 00 00 00 10 54 2D 57 32 4B 33 2D 48 ...8....T-W2K3-H
54 2D 57 32 4B 33 2D 48                         T-W2K3-H
\\.\PhysicalDrive2 reservations:
00 00 00 38 00 00 00 00                         ...8....
\\.\PhysicalDrive3 registered keys:
00 00 00 CD 00 00 00 10 54 2D 57 32 4B 33 2D 48 ........T-W2K3-H
54 2D 57 32 4B 33 2D 48                         T-W2K3-H
\\.\PhysicalDrive3 reservations:
00 00 00 CD 00 00 00 10 54 2D 57 32 4B 33 2D 48 ........T-W2K3-H
00 00 00 00 00 06 00 00                         ........
\\.\PhysicalDrive4 registered keys:
00 00 00 45 00 00 00 10 54 2D 57 32 4B 33 2D 48 ...E....T-W2K3-H
54 2D 57 32 4B 33 2D 48                         T-W2K3-H
\\.\PhysicalDrive4 reservations:
00 00 00 45 00 00 00 00                         ...E....
```

`pgr tur`

You can send a “test unit ready” command to the device to show its status.

```
pgr tur devicename
```

Example

```
dsmcli> pgr tur \\.\PhysicalDrive3
result: 0 status: 0x0 sense: 0x0d 0x50 0x68
dsmcli> pgr tur \\.\PhysicalDrive4
result: 0 status: 0x0 sense: 0x0d 0x50 0x68
```

Uninstalling the MSA2000 Family MPIO DSM

To uninstall the MPIO DSM, perform the following steps.

1. Choose Start > Control Panel > Add/Remove Programs.
2. Choose HP StorageWorks MSA2000 Family Multi-Path DSM and click Change/Remove.
3. Respond appropriately to the prompts.

   The progress of the uninstall procedure is displayed in a splash screen, which automatically closes after the drivers are uninstalled.

Note – If there are no other DSMs on the server, the uninstall procedure removes the Microsoft MPIO drivers as well as the MSA2000 Family MPIO DSM. If there are other DSMs on the server, only the MSA2000 Family MPIO DSM is removed.
