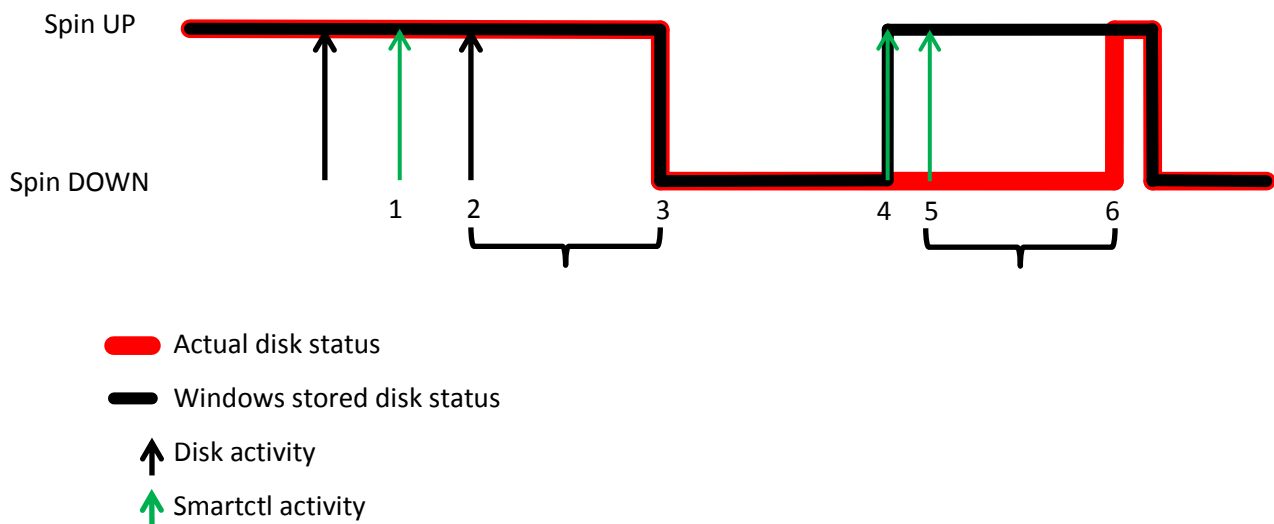


Ticket #513 - Windows spins up and down disk even when "-n standby" is used

Test environment:

Motherboard: ASRock H87 Pro4
Chipset: Intel H87
Processor: Intel i5-4570
Disks: Samsung SSD 840 EVO 500GB SATA3, AHCI, system disk, not used in this test
MAXTOR STM31000340AS SATA2, AHCI
Seagate ST31500341AS SATA2, AHCI
WDC WD20EARS-00MVWB0 SATA2, AHCI
OS: Windows 7 Professional
Power options: Turn off hard disk after 1 minute (usually longer, but reduced just to make the test)



- 1 Smartctl checks an active disk (I do it just to write the log).
- 2 Last disk activity.
- 2 – 3 Windows sees no activity on disk, so after the timeout, it sends disk to standby status.
- 3 Disk is spun off by Windows.
- 4 Smartctl checks disk status, reports it is in standby and go no further to prevent waking it. Nevertheless Windows sees “activity” on disk and marks it as active.
- 5 A new smartctl command, just to check disk is still in standby. This is the last “activity” on disk so Windows starts a new timeout to send disk to standby.
- 5 – 6 Windows sees no more activity on disk, so after the timeout, it thinks it has to send disk to standby status.
- 6 Windows tries to spin down a disk that is already spun down, so it (Windows) spins up and immediately down the disk.

NOTES:

Actual disk status checked with smartctl, watt-meter and my fingers on the disk. Windows point of view checked with my own DiskPowerStatus and verified using a chronograph that shows this information is coherent with the 1 minute disk sleep timer.

I used standby and spin-down as synonymous. I don't know if there is any internal difference.

I repeated the test with the three data disks with the same results.

Smartctl LOGS

***** 1: Disk ACTIVE *****

C:\>smartctl -r ioctl,2 -n standby -d ata -i sdc
smartctl 6.3 2014-07-26 r3976 [x86_64-w64-mingw32-win7-spl] (sf-6.3-1)
Copyright (C) 2002-14, Bruce Allen, Christian Franke, www.smartmontools.org

\\.\PhysicalDrive2: successfully opened

REPORT-IOCTL: Device=sdC Command=CHECK POWER MODE
Input: FR=..., SC=..., LL=..., LM=..., LH=..., DEV=..., CMD=0xe5
GetDevicePowerState() succeeded, state=1
IOCTL_ATA_PASS_THROUGH succeeded, bytes returned: 48
Input : CMD=0xe5, FR=0x00, SC=0x00, SN=0x00, CL=0x00, CH=0x00, SEL=0x00
Output: STS=0x50,ERR=0x00, SC=0xff, SN=0x00, CL=0x00, CH=0x00, SEL=0xe0
[Duration: 0.001s]
Output: ERR=0x00, SC=0xff, LL=0x00, LM=0x00, LH=0x00, DEV=0xe0, STS=0x50
REPORT-IOCTL: Device=sdC Command=CHECK POWER MODE returned 0
Sector Count Register (BASE-16): ff

REPORT-IOCTL: Device=sdC Command=IDENTIFY DEVICE
Input: FR=..., SC=0x01, LL=..., LM=..., LH=..., DEV=..., CMD=0xec IN
IOCTL_ATA_PASS_THROUGH succeeded, bytes returned: 564
Input : CMD=0xec, FR=0x00, SC=0x01, SN=0x00, CL=0x00, CH=0x00, SEL=0x00
Output: STS=0x50,ERR=0x00, SC=0xff, SN=0x00, CL=0x00, CH=0x00, SEL=0xe0
[Duration: 0.002s]
Output: ERR=0x00, SC=0xff, LL=0x00, LM=0x00, LH=0x00, DEV=0xe0, STS=0x50
REPORT-IOCTL: Device=sdC Command=IDENTIFY DEVICE returned 0

==== [IDENTIFY DEVICE] DATA START (BASE-16) ====
000-015: 5a 0c ff 3f 37 c8 10 00 00 00 00 00 3f 00 00 00 |Z..?7.....?...|
016-031: 00 00 00 00 20 20 20 20 20 20 20 20 20 20 20 20 |.....|
032-047: 56 39 32 53 37 37 56 4a 00 00 00 00 04 00 43 43 |V92S77VJ.....CC|
048-063: 48 31 20 20 20 20 54 53 31 33 30 35 33 30 31 34 |H1 TS13053014|
064-079: 53 41 20 20 20 20 20 20 20 20 20 20 20 20 20 20 |SA |
080-095: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 10 80 | ..|
096-111: 00 00 00 2f 00 40 00 02 00 02 07 00 ff 3f 10 00 |.../.@.....?..|
112-127: 3f 00 10 fc fb 00 10 01 ff ff ff 0f 00 00 07 00 |?.....|
128-143: 03 00 78 00 78 00 78 00 78 00 00 00 00 00 00 00 |...x.x.x.x.....|
144-159: 00 00 00 00 00 00 1f 00 06 05 00 00 48 00 40 00 |.....H.@.|
160-175: f0 01 29 00 6b 34 01 7f 63 41 69 34 01 be 63 41 |..)k4..cAi4..cA|
176-191: 7f 20 81 00 81 00 00 00 fe ff 00 00 00 fe 00 00 |.|
192-207: 00 00 00 00 00 00 00 00 ef 72 a8 ae 00 00 00 00 |.....r.....|
208-223: 00 00 00 00 00 00 00 00 00 00 50 00 c5 1e 15 68 fa |.....P....h.|
224-239: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 1e 40 |.....@|
240-255: 1c 40 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.@.....|
256-271: 29 00 30 7b a8 ae 30 7b a8 ae 20 20 02 00 40 01 |).0{..0{.. ..@.|
272-287: 00 01 00 50 06 3c 0a 3c 00 00 3c 00 00 00 08 00 |...P.<<.<.....|
288-303: 00 00 00 00 0f 00 80 02 00 00 00 00 0a 00 00 00 |.....|
304-319: 00 00 00 00 00 00 00 00 00 00 00 00 00 2d 00 80 |.....-..|
320-335: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
336-351: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
352-367: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
368-383: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
384-399: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
400-415: 00 00 00 00 00 00 00 00 00 00 00 00 00 3f 10 00 00 |.....?...|
416-431: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
432-447: 00 00 20 1c 00 00 00 00 00 00 00 00 10 10 00 00 |..|
448-463: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
464-479: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
480-495: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
496-511: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 a5 4f |.....O|
==== [IDENTIFY DEVICE] DATA END (512 Bytes) ====

=== START OF INFORMATION SECTION ===

Model Family: Seagate Barracuda 7200.11
Device Model: ST31500341AS
Serial Number: 9VS277JV
LU WWN Device Id: 5 000c50 0151efa68
Firmware Version: CC1H
User Capacity: 1.500.300.828.160 bytes [1,50 TB]
Sector Size: 512 bytes logical/physical
Rotation Rate: 7200 rpm
Device is: In smartctl database [for details use: -P show]
ATA Version is: ATA8-ACS T13/1699-D revision 4
SATA Version is: SATA 2.6, 3.0 Gb/s
Local Time is: Sun Jan 18 16:03:53 2015
SMART support is: Available - device has SMART capability.
SMART support is: Enabled
Power mode is: ACTIVE or IDLE

***** 4: Disk IN STANDBY *****

```
C:\>smartctl -r ioctl,2 -n standby -d ata -i sdc
smartctl 6.3 2014-07-26 r3976 [x86_64-w64-mingw32-win7-spl] (sf-6.3-1)
Copyright (C) 2002-14, Bruce Allen, Christian Franke, www.smartmontools.org
```

\\.\PhysicalDrive2: successfully opened

```
REPORT-IOCTL: Device=sdC Command=CHECK POWER MODE
Input: FR=..., SC=..., LL=..., LM=..., LH=..., DEV=..., CMD=0xe5
GetDevicePowerState() succeeded, state=1
IOCTL_ATA_PASS_THROUGH succeeded, bytes returned: 48
Input : CMD=0xe5, FR=0x00, SC=0x00, SN=0x00, CL=0x00, CH=0x00, SEL=0x00
Output: STS=0x50,ERR=0x00, SC=0x00, SN=0x00, CL=0x00, CH=0x00, SEL=0xe0
[Duration: 0.002s]
Output: ERR=0x00, SC=0x00, LL=0x00, LM=0x00, LH=0x00, DEV=0xe0, STS=0x50
REPORT-IOCTL: Device=sdC Command=CHECK POWER MODE returned 0
Sector Count Register (BASE-16): 00
Device is in STANDBY mode, exit(2)
```

***** 5: Disk IN STANDBY (but Windows thinks it is not) *****

```
C:\>smartctl -r ioctl,2 -n standby -d ata -i sdc
smartctl 6.3 2014-07-26 r3976 [x86_64-w64-mingw32-win7-spl] (sf-6.3-1)
Copyright (C) 2002-14, Bruce Allen, Christian Franke, www.smartmontools.org
```

\\.\PhysicalDrive2: successfully opened

```
REPORT-IOCTL: Device=sdC Command=CHECK POWER MODE
Input: FR=..., SC=..., LL=..., LM=..., LH=..., DEV=..., CMD=0xe5
GetDevicePowerState() succeeded, state=1
IOCTL_ATA_PASS_THROUGH succeeded, bytes returned: 48
Input : CMD=0xe5, FR=0x00, SC=0x00, SN=0x00, CL=0x00, CH=0x00, SEL=0x00
Output: STS=0x50,ERR=0x00, SC=0x00, SN=0x00, CL=0x00, CH=0x00, SEL=0xe0
[Duration: 0.002s]
Output: ERR=0x00, SC=0x00, LL=0x00, LM=0x00, LH=0x00, DEV=0xe0, STS=0x50
REPORT-IOCTL: Device=sdC Command=CHECK POWER MODE returned 0
Sector Count Register (BASE-16): 00
Device is in STANDBY mode, exit(2)
```

DiskPowerStatus principal functions, written in C# using Visual Studio 2008:

```
// diskname puede ser un disco físico como \\.\PhysicalDrive0 o un volumen lógico como C: (sin \)
// Devuelve true si está encendido y false si está apagado
public static bool GetDiskPowerState(string diskname)
{
    SafeFileHandle devicehandle;
    bool estado;

    if (diskname.Substring(0, 1) != "\\")
        diskname = "\\.\\" + diskname;
    try
    {
        devicehandle = Win32.W_CreateFile(
            diskname, // fileName
            0, // desiredAccess (quizás así no despierte el disco)
            Win32.W_FileShare.Read | Win32.W_FileShare.Write | Win32.W_FileShare.Delete, // shareMode
            Win32.W_CreationDisposition.OpenExisting, // creationDisposition
            Win32.W_FileAttributesAndFlags.Normal // attributesAndFlags
        );
        Win32.W_GetDevicePowerState(devicehandle, out estado);
        devicehandle.Close();
        return estado;
    }
    catch (Exception e)
    {
        throw e;
    }
}

/* GetDevicePowerState
*
* BOOL WINAPI GetDevicePowerState(
* __in HANDLE hDevice,
* __out BOOL* pFOn
* );
* If the function succeeds, the return value is nonzero. If the function fails, the return value is zero.
*/
//[DllImport("Kernel32.DLL", CharSet = CharSet.Auto, SetLastError = true)]
[DllImport("Kernel32.dll", EntryPoint = "GetDevicePowerState", SetLastError = false, CharSet = CharSet.Auto)]
[return: MarshalAs(UnmanagedType.Bool)]
private static extern bool GetDevicePowerState_(
    [In] SafeFileHandle hDevice,
    [Out, MarshalAs(UnmanagedType.U1)] out bool fOn);
public static void W_GetDevicePowerState(SafeFileHandle hDevice, out bool fOn)
{
    if (!Win32.GetDevicePowerState_(hDevice, out fOn))
        Marshal.ThrowExceptionForHR(Marshal.GetHRForLastWin32Error());
}
```