



Seagate® Nytro™ XP6500  
Flash Accelerator Cards  
User Guide

**Nytro XP6500-8A1536**  
**Nytro XP6500-8A4096**

100766305, Rev. B  
July 2015

## Revision History

Version and Date	Description of Changes
Rev. B, July 2015	Changed the following sections: <ul style="list-style-type: none"><li>■ <a href="#">Section 1.1, Overview</a>, added information for 4-TB products.</li><li>■ <a href="#">Section 2.3.2.4.1, Installing UEK Oracle Linux 6 on a Nytro XP6500 Disk</a>, added UEK to the section title.</li><li>■ <a href="#">Section 2.3.2.6, VMware ESXi5.1</a>, removed ESXi 5.5 from the section title.</li><li>■ <a href="#">Section 2.4.1, BIOS and System Configuration</a>, removed invalid link.</li><li>■ <a href="#">Section 3.1.4, Thermal Considerations</a>, changed "Operating altitude" to "Maximum operating altitude."</li><li>■ <a href="#">Section 3.1.4.1, Maximum Sensor Temperature</a>, replaced "The maximum sensor temperature for the Nytro XP6500 cards is 76 °C" with "The maximum sensor temperature for the Flash modules on the Nytro XP6500 cards is 76 °C."</li></ul>
Rev. A, June 2015	First release of the document.

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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## Seagate Technology Support Services

For Nytro Support, visit: <http://www.seagate.com/products/solid-state-flash-storage/accelerator-cards/>

For information regarding online support and services, visit: <http://www.seagate.com/about/contact-us/technical-support/>

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For information regarding Warranty Support, visit: <http://www.seagate.com/support/warranty-and-replacements/>

For information regarding data recovery services, visit: <http://www.seagate.com/services-software/data-recovery-services/>

For Seagate OEM and Distribution partner portal, visit: <http://www.seagate.com/partners>

For Seagate reseller portal, visit: <http://www.seagate.com/partners/my-spp-dashboard/>

# Chapter 1: Introduction

## 1.1 Overview

This document provides general information and tells you how to use the Seagate® Nytro™ XP6500 Flash Accelerator card. To configure, monitor, and maintain the card using the software tools provided, refer to the *Seagate® Nytro™ XP6500 Software User Guide*.

The Nytro XP6500 card addresses the move toward hyper-convergence where vast computing and storage resources come together to process massive information loads from the cloud, big data, and hyperscale data centers.

The Nytro XP6500 card combines Flash technology with Seagate's industry-leading RAID-on-Chip (ROC) implementation with the advantage of on-board Dynamic Random Access Memory (DRAM). The Nytro XP6500 card offers the lowest latency flash in the Nytro product portfolio providing consistent, low-response times, even under heavy I/O loads. The Nytro XP6500 card provides shared writes and chaining of I/Os queued for back end to provide benefits of serializing back-to-back writes when the back-end port is busy. The shared writes also permit serving write hits more efficiently by reducing the back-end traffic for updates to same pages.

The Nytro XP6500 card's buffered fast-path provides ultra-low latency writes through a simple, semi-automatic store (into DRAM) and forward mechanism. The Nytro XP6500 card includes a virtual drive (VD) with Write Back, no read ahead, and direct IO policy. RAID 0 with Write Back mode and Write Through mode is supported with Direct I/O (DIO).

The Nytro XP6500 card includes an eight-lane PCI Express® (PCIe®) 3.0 host interface and ROC-based controller with a DRAM buffer which provides consistent, ultra-low latency.

The following table shows characteristics of the Nytro XP6500 card models.

**Table 1 Seagate Nytro XP6500 Card Characteristics Summary**

Device Name	Model Number	Raw Capacity	Connector	Flash Controller	NAND Type	Card Style	Controller
Nytro XP6500	XP6500-8A1536LP	1536 GB	X8 PCIe 3.0	SF2582	Enterprise Multi-Level Cell (eMLC)	Half Height, Half Length (HHHL)	SAS3108
Nytro XP6500	XP6500-8A1536FH	1536 GB	X8 PCIe 3.0	SF2582	eMLC	Full Height, Half Length (FHHL)	SAS3108
Nytro XP6500	XP6500-8A4096LP	4096 GB	X8 PCIe 3.0	SF2582	MLC	HHHL	SAS3108
Nytro XP6500	XP6500-8A4096FH	4096 GB	X8 PCIe 3.0	SF2582	MLC	FHHL	SAS3108

### Features

- High performance
  - DRAM buffer for ultra-low write latency and consistent latency over a wide range of I/OPs.
  - High bandwidth and high random-read I/OPs for enhanced system responsiveness and an improved user experience.
  - Eight on-board Nytro Flash modules present themselves to the operating system as one drive.
  - 6Gb/s Nytro Flash module interfaces.
  - TRIM feature support.
- Cost-effective
  - Servers can use the Nytro XP6500 as a boot volume, eliminating the need for separate boot drives.
  - Supercaps remove the need for battery maintenance.
- Ease-of-use

- 
- Easy to install and manage.
  - Operating System Support for Windows®, Linux®, VMware®, and FreeBSD® operating systems.
  - Eight-lane, PCIe 3.0 host interface.
  - GUI and CLI-based management utilities - featuring an online controller firmware upgrade.
  - LED indicators for life and status.
  - Enhanced data protection
    - DDR Offload uses the external SuperCap kit to protect the DRAM content during power failure, if DDR3 Write Back is enabled.
    - 2-GB DRAM Cache offload support onto an on-board Open NAND Flash Interface (ONFi).
    - Secure Erase protects the Nytro card from unauthorized access
    - The Automatic Region Lock feature protects from data corruption by restricting any I/O operations before the back-end host write operations are completed.

## 1.2 Related Documents

Refer to the following documents for more information on the Nytro XP6500 card and related tools.

- *Seagate® Nytro™ XP6500 Flash Accelerator Cards Software User Guide*
- *Seagate® NytroCLI™ Release Notes*
- *Seagate® Nytro™ XP6500 Flash Accelerator Cards Quick Installation Guide*

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## Chapter 2: Installation

### 2.1 Quick Installation Instructions

You can use the quick installation instructions to install your Nytro XP6500 card, or you can see the next section if you need more detailed installation instructions.

To quickly install your Nytro XP6500 card, follow these instructions.

1. Unpack the Nytro XP6500 card and inspect it for damage.
2. Turn off the server, and remove the power cord.
3. Remove the cover from the server.
4. Insert the card in an available PCIe slot that supports at least 41.9 W of power.
5. Secure the bracket to the system's chassis.
6. Replace the cover and the power cord, then turn on the server.

The Nytro XP6500 card hardware installation is complete.

### 2.2 Hardware Installation Instructions

#### 2.2.1 Card Retention, Shipping, and the PCIe Specification

The PCIe specification requires that add-in cards with a mass of greater than 350 grams must have additional card retention at the server level. Neither the connector nor the optional *hockey stick* feature described in the PCIe specification provides the required retention.

Server OEMs and ODMs are solely responsible for choosing and qualifying their own server and rack shipping solution. Seagate does not qualify the server and rack shipping solution and is not responsible for such solution or any impact to Seagate products.

Seagate will make available mechanical design collateral for its products, which may be used by server OEMs and ODMs to design retention features for their server products. Seagate information is provided AS IS only and Seagate does not certify any design retention features used by OEMs and ODMs.

Seagate does not perform server and rack shock and vibration testing of OEM and ODM products. OEMs and ODMs are solely responsible for any server and rack shock and vibration testing.

#### 2.2.2 Hardware Installation Steps

1. **Unpack the Nytro XP6500 card and inspect it for damage.** Unpack the card in a static-free environment and follow good antistatic grounding procedures. Remove the Nytro XP6500 card from the antistatic bag, and carefully inspect it for damage. If you notice any damage, contact Seagate, or your reseller support representative.

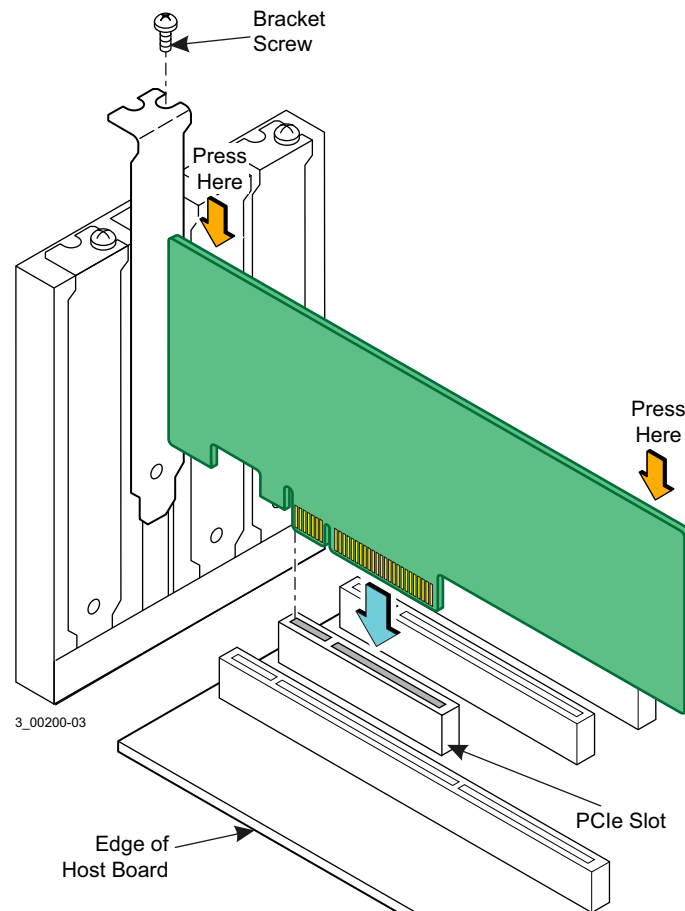
**NOTE** Back up your data before changing your system configuration.

2. **Prepare the computer.** Turn off the server, and disconnect the power cords from the power supply. Remove the cover from the chassis.

**WARNING** To avoid electrical shock, disconnect the server from the main power and from any networks before you install the card.

3. **Insert the Nytro XP6500 card in an available PCIe slot that provides at least 41.9 W of power.** Locate an empty PCIe slot. Make sure the PCIe slot provides at least 41.9 W of power. Without sufficient power the Nytro XP6500 card may be damaged or run at less than optimal performance. Remove the blank bracket panel on the server chassis that aligns with the empty PCIe slot. Save the bracket screw, if applicable. Align the card to the PCIe slot. Press down gently, but firmly, to properly seat the card in the slot. The following figure shows how to insert the card in a PCIe slot.

**Figure 1 Card Installation for the Nytro XP6500**



**NOTE** Your card shape, size, and component locations might vary from this drawing.

**CAUTION** For highest performance, make sure that the PCIe slot is PCIe 3.0 and make sure that it has an active width of dedicated eight lanes.

**CAUTION** The Nytro XP6500-8A1536LP card comes with an external supercap. You must connect this supercap to the Nytro XP6500 card as part of card installation in the PCIe slot.

**CAUTION** To operate this card, your server environment must meet the 550 LFM (linear feet/minute) minimum airflow requirement.

4. **Secure the bracket to the system's chassis.** Install the bracket screw, if applicable, or engage the system retention mechanism to secure the card to the system's chassis.
5. **Replace the cover, reconnect the power cords, and power up the system.** Replace the server's cover, reconnect the power cords, and reconnect any network cables. Turn on the power.



---

Use the next procedure to install the appropriate operating system drivers.

## 2.3 Software Installation Instructions

### 2.3.1 Windows Driver Installation

The Seagate drivers for Windows Server® 2012 and Windows Server 2008 are available online.

Download the latest Windows drivers from the Seagate website:

1. Go to the following Seagate website:  
<http://www.seagate.com/products/solid-state-flash-storage/accelerator-cards/>
2. Click on **Nytro XP6500 Flash Accelerator Card**.
3. Click **Support**, and click the driver you need.
4. Download the driver files.
5. Open the Windows Driver Configuration Utility file and follow the instructions to install the driver.

### 2.3.2 Linux Driver Installation

Seagate provides Linux drivers as binary and as source code.

- Precompiled binaries to add to an existing installation using driver update disks or RPMs for selected distributions.
- Fusion-MPT™ source to add or update any distribution.

#### 2.3.2.1 Downloading the Drivers

Download the latest Linux® drivers from the Seagate website.

1. Go to the following Seagate website:  
<http://www.seagate.com/products/solid-state-flash-storage/accelerator-cards/>
2. Click on **Nytro XP6500 Flash Accelerator Card**.
3. Click **Support**. Here you can download product documentation, firmware, and host drivers for all supported operating systems.
4. To download Linux drivers, click on the Linux operating system from the list under the Linux/Unix header. For example, to download RHEL 7.0 drivers, click Nytro Driver RHEL7 (version number).
5. Read the release notes and click **I ACCEPT**. Click **DOWNLOAD** to download the drivers.

6. Download the driver files and extract the zipped files. The table below lists the unzipped files:

**Table 1 What's in the Zip File**

Name	Description
kmod-nytrolin-<version>_<os>-<tag>.x86_64.rpm kmod-nytrolin-<version>_oel6.<revision>_uek-1.x86_64.rpm <b>Example:</b> kmod-nytrolin-06.703.11.261_rhel7.0-1.x86_64.rpm <b>Oracle example:</b> Oracle Linux 6.5: kmod-nytrolin-<version>_oel6.5_uek-1.x86_64.rpm	Installable rpm for a specific Linux operating system. For Oracle Linux UEK kernels, use the rpm with _uek tag.
nytrolin-<version>_<os>-<tag>.src.rpm <b>Example:</b> nytrolin-06.703.11.261_rhel7.0-1.src.rpm	Nytrolin driver sources compilable on the distro's kernel.
nytrolin-<version>_<os>-<tag>.x86_64.iso.gz <b>Example:</b> nytrolin-06.703.11.261_rhel7.0-1.x86_64.iso.gz	Driver Update Disk

7. After unzipping, install the driver with this command:  

```
# rpm -ivh kmod-nytrolin-<version>_rhel7.1-1.x86_64.rpm
```
8. To upgrade a driver, run this command:  

```
# rpm -Uvh kmod-nytrolin-<version>_rhel7.1-1.x86_64.rpm
```
9. Reboot the system.

### 2.3.2.2 Ultra Low Latency Driver (ULLD) for Linux

In Linux, the Nytro XP6500 uses an Ultra Low latency Driver (ULLD) which is optimized for achieving ultra-low latency and scaling I/OPs. This ULLD exposes a new block device interface (`/dev/nytro-sdX`) in addition to the traditional SCSI block device (`/dev/sdX`).

Both block devices represent the same underlying target, so there is a one-to-one correspondence for both the devices and for partitions created on the devices, if any. You must use the ULLD device (`/dev/nytro-sdX`) for applications and the traditional SCSI block device (`/dev/sdX`) for the Linux operating system installation on the Nytro XP6500 card.

**NOTE** Make sure you use only one interface at a time.

### 2.3.2.3 Creating a Driver Update Disk (DUD) on a USB drive

1. Using the extracted files from the zip file from [Section 2.3.2.1, Downloading the Drivers](#) extract the driver ISO from DUD file using the following command:

```
# gunzip nytrolin-<version>_<os>-<tag>.x86_64.iso.gz
```

**For example:** `# gunzip nytrolin-06.703.11.261_rhel7.0-1.x86_64.iso.gz`

2. Transfer the extracted ISO file to a USB drive. In the above example, the ISO file is:  
`nytrolin-06.703.11.261_rhel7.0-1.x86_64.iso`

### 2.3.2.4 Installing a Linux Operating System on a Nytro XP6500 Virtual Disk

1. Boot the server with the operating system installation CD or DVD. Refer to your system documentation, if needed.
2. Enter the following boot option to load the driver disk during installation: `linux dd`
3. Press **Enter** to continue the install.

- 
4. When prompted, insert the USB containing the DUD created in [Section 2.3.2.3, Creating a Driver Update Disk \(DUD\) on a USB drive](#). The utility locates and loads the driver for your controller.

The ULLD for Nytro XP6500 creates two interfaces to the same block device:

- ULLD block device (`/dev/nytro-sdX`)
- SCSI block device (`/dev/sdX`)

**Example:** If the SCSI block device is `/dev/sdc`, the ULLD block device is named `/dev/nytro-sdc`

5. At the **Device Selection Screen**, select the SCSI device named SEAGATE XP6500.
6. Partition the boot device as shown in the figures below. You can create additional partitions as needed.

The figures below show device selection for RHEL 7.0, RHEL 6.0, CentOS 6, Oracle Linux 6.0, and SuSE Enterprise Linux 11.0 SP2/SP3.

7. Complete the operating system installation and reboot the server.

#### 2.3.2.4.1 Installing UEK Oracle Linux 6.0 on a Nytro XP6500 Disk

You must perform the following additional steps for Oracle Linux 6.0 installation on the Nytro XP6500 Virtual Disk.

1. Reboot the server into a RHEL-compatible kernel (`kernel-2.6.32-xxx.el6`).
2. Install the corresponding UEK rpm of the nytrolin driver.

Example: Oracle Linux 6.5, install `kmod-nytrolin-<version>_oel6.5_uek-1.x86_64.rpm`

3. Reboot the server into the UEK kernel.

Figure 2 Device Selection for RHEL 7.0

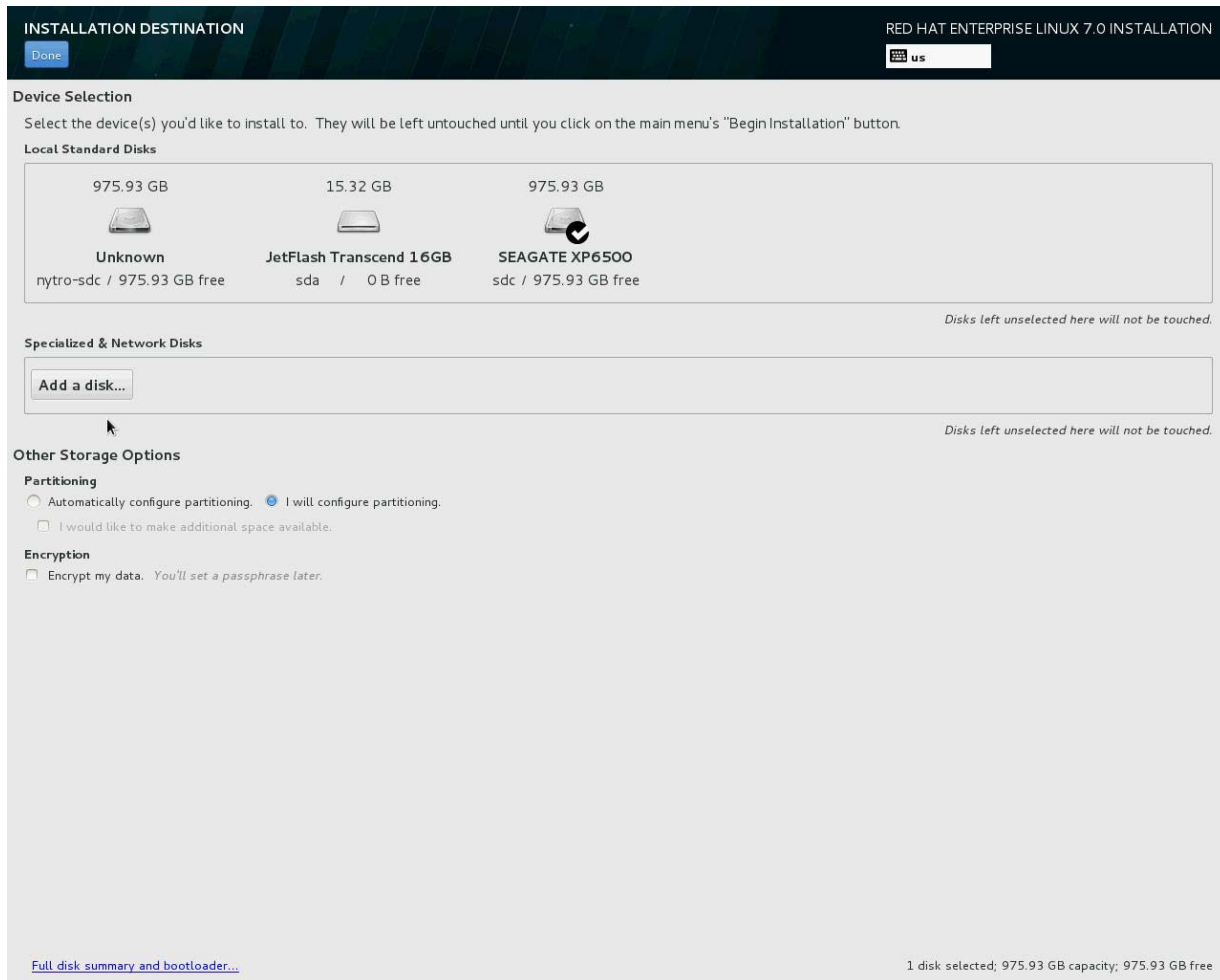
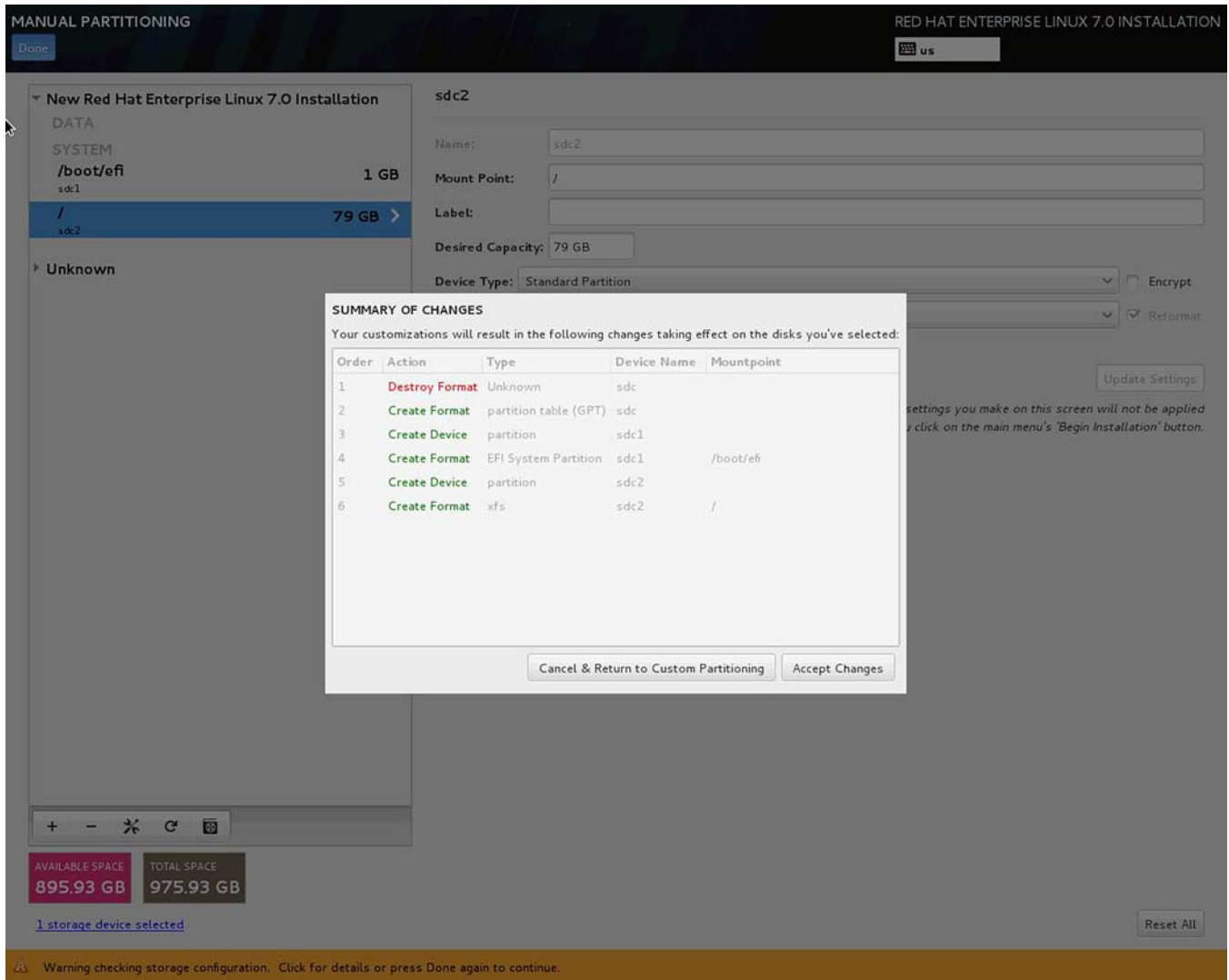


Figure 3 Manual Partitioning for RHEL 7.0



**Figure 4 Selecting Installation Devices for RHEL 6.0**

Below are the storage devices you've selected to be a part of this installation. Please indicate using the arrows below which devices you'd like to use as data drives (these will not be formatted, only mounted) and which devices you'd like to use as system drives (these may be formatted). Please also indicate which system drive will have the bootloader installed.

**Data Storage Devices** (to be mounted only)

Model	Capacity	Vendor	Identifier
ATA ST3160318AS	152627 MB		pci-0000:00:1f.2-scsi-1:0:0:0
Unknown	1247744 MB		nytro-sdc
iDRAC Virtual Floppy	3819 MB	iDRAC	pci-0000:00:1d.7-usb-0:3:1.1-s

**Install Target Devices**

Boot Loader	Model	Capacity	Identifier
<input checked="" type="radio"/>	SEAGATE XP6500	1247744 MB	pci-0000:07:00:0-

**Tip:** Install target devices will be reformatted and wiped of any data. Make sure you have backups.

Back Next

Figure 5 Partitioning Example for RHEL 6.0

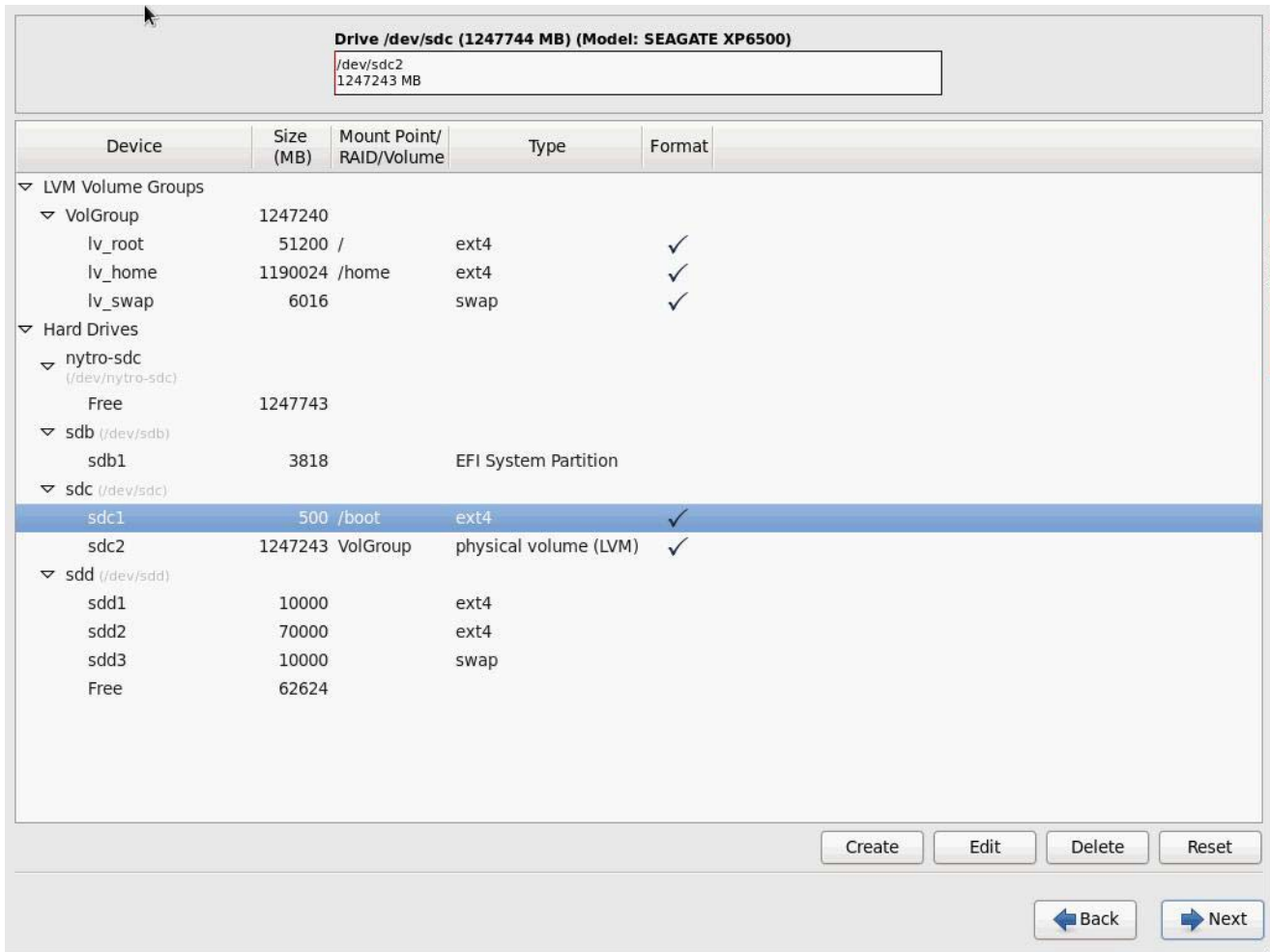


Figure 6 Selecting the Installation Disk for SuSE 11

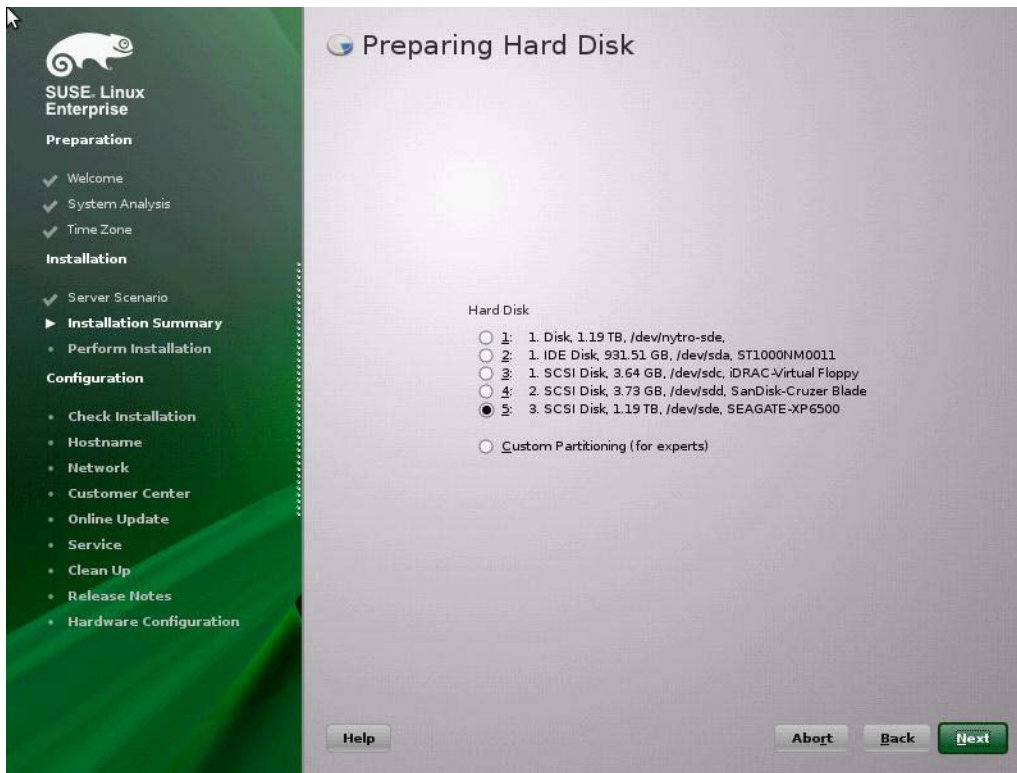


Figure 7 Preparing the Hard Disk for SuSE 11

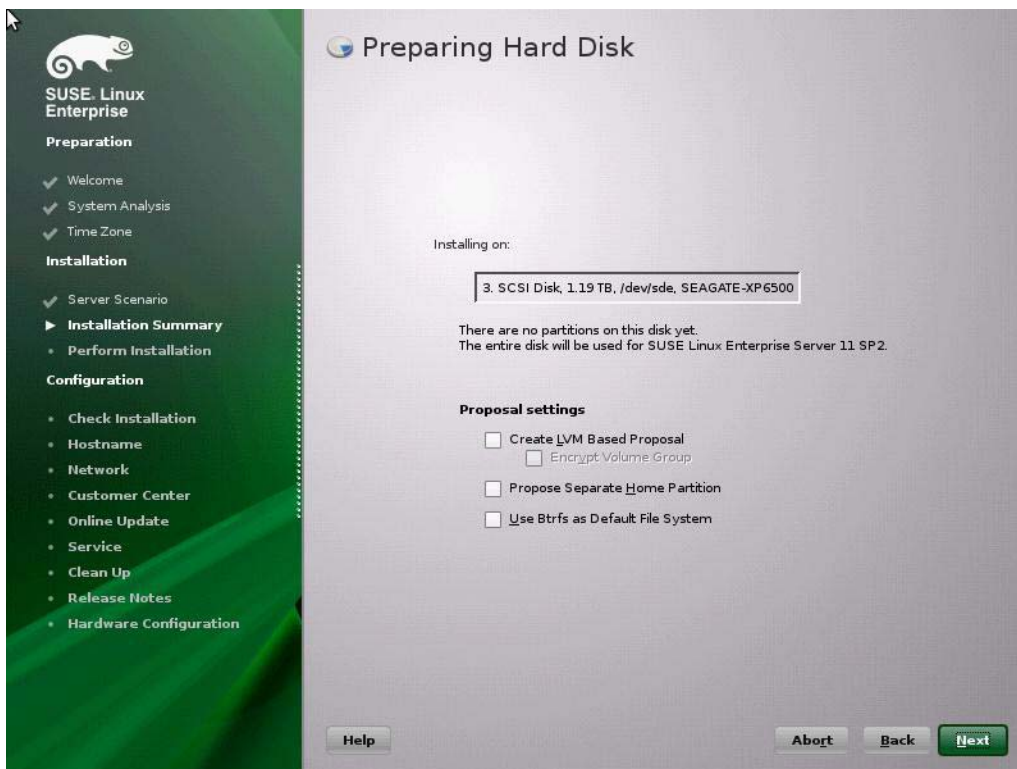
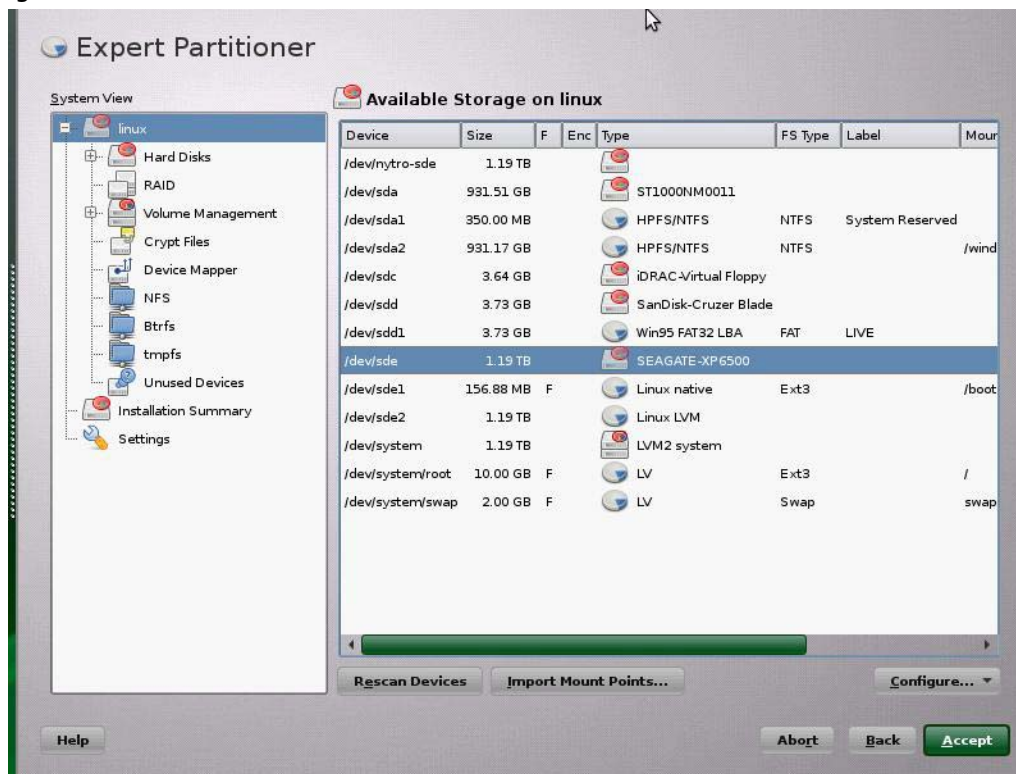




Figure 8 Partitioning for SuSE 11



### 2.3.2.5 Build Driver for Mainline Kernels 2.6.38 and Later Kernels

1. Download drivers Nytro XP6500 for RHEL 6 from the following Seagate website:  
<http://www.seagate.com/products/solid-state-flash-storage/accelerator-cards/>
2. See [Section 2.3.2.1, Downloading the Drivers](#).
3. Transfer the RHEL 6.5 source rpm to the Linux Server where you will build the drivers.
4. Install the RHEL 6.5 source rpm. The RHEL 6.5 source rpm filename is:

```
# rpm -ivh nytrolin-<version>_rhel6.5-1.src.rpm
```

5. The sources are installed at ~/rpmbuild/

```
# cd ~/rpmbuild/SPECS/
```

```
# rpmbuild -bp --target=x86_64 nytrolin.spec
```

**NOTE** You must resolve all dependencies to complete the above step.

6. The driver sources are placed at:

```
# ls ../BUILD/nytrolin-<version>_rhel6.5/source/
```

7. Refer to the README in nytrolin-<version>\_rhel6.5/source/ for the steps to build the driver.

### 2.3.2.6 VMware ESXi5.1

Download the latest VMware® drivers from the Seagate website.

1. Go to the following Seagate website:  
<http://www.seagate.com/products/solid-state-flash-storage/accelerator-cards/>
2. Click on **Nytro XP6500 Flash Accelerator Card**.

3. Click **Support**, and click the driver you need.
4. Download the driver files and unzip. Install the drivers.

You have now completed the driver installation for the Nytro XP6500 card.

## 2.4 Performance Tuning Guidelines

### 2.4.1 BIOS and System Configuration

1. Make sure that the latest version of BIOS is running in the server.
2. Configure the server BIOS settings for low-latency.
  - To configure the low-latency settings in HP servers, refer to the *Recommended Platform Tuning* section of the *Configuring and Tuning HP ProLiant Servers for Low-Latency Applications* technical white paper.
  - To configure the low-latency settings in Dell servers, refer to the *Configuring Low-Latency Environments* of the *Dell PowerEdge Servers* white paper:

[http://www.dell.com/downloads/global/products/pedge/en/configuring\\_dell\\_powerEdge\\_servers\\_for\\_low\\_latency\\_12132010\\_final.pdf](http://www.dell.com/downloads/global/products/pedge/en/configuring_dell_powerEdge_servers_for_low_latency_12132010_final.pdf)

### 2.4.2 Linux System Configuration

1. Run the following command to set execute permissions for the nytro set affinity script:

```
# chmod +x /etc/init.d/nytrolin_set_affinity.sh
```
2. On the Linux operating system, run the following Nytro Linux Driver set affinity script:

```
# /etc/init.d/nytrolin_set_affinity.sh
```
3. Add this script to the `/etc/rc.local` to make sure that this script runs on each system reboot.
4. Make sure the partitions on the Nytro device align to 1-MB drive offset using `sfdisk` utility. Refer to the `sfdisk` man page for more details.

**Example:** To create a 1MB-aligned partition of the entire disk capacity

```
# echo "2048,," | sfdisk -uS /dev/nytro-sda --force
```

### 2.4.3 File System Configuration

Use the XFS file system for low-latency and use the following command to format the drive partition for the XFS file system:

```
mkfs.xfs <nytro-device-partition>
```

**Example:**

```
# mkfs.xfs /dev/nytro-sda2
```

Use the following options to mount the XFS file system:

```
mount -o nobARRIER,NOATIME,NODIRATIME <nytro-dev-partition> <mount-point>
```

**Example:**

```
# mount -o nobARRIER,NOATIME,NODIRATIME /dev/nytro-sda1 /nytro-xh6451
```

---

## 2.5 BIOS Boot Support Settings

The Nytro BIOS permits you to change the card properties. You can specify that the card is eligible for Seagate software control or that the card is reserved for control by software that does not belong to Seagate. You can select from the following settings in the Boot Support feature of the BIOS:

**Enabled BIOS** permits the BIOS and the operating system driver to control the card.

**Disabled** prevents the motherboard from considering the card as a boot device. Therefore you cannot boot from the card. You can still see the card when you use the configuration protocol, and in all other respects, the card performs as usual. You can use this option when you have multiple cards in your system and you do not plan to boot from this card.

Changes to these settings display in the Status field on the main Adapter List menu. The new setting takes effect when the BIOS reloads when you reboot the system.

Selecting Disabled prevents the user from booting from the card, but in all other respects the card works the same.

### 2.5.1 Changing the BIOS Settings

To change the BIOS settings, follow these instructions:

1. At power-on, press Ctrl-R to log on to the BIOS screen.

**NOTE** The model number, date, and firmware number for your Nytro XP6500 card will vary from the illustrations below.

2. Press **Enter** to go to **Adapter Properties**.
3. To toggle between the **Boot Support** settings, use the **-/+ Enter** keys.
4. Press **Esc** to exit the BIOS menu.

## 2.6 Managing the Nytro XP6500 Card

You can use the following tools to manage your Nytro XP6500 card:

**BIOS** This tool is available only during boot. Use this tool to view information about the card and to configure the boot support options. See above, **Section 2.5, BIOS Boot Support Settings**.

**Nytr CLI** This menu-driven, command line interface tool permits you to configure, monitor, and maintain the Nytro XP6500 card. Refer to the *Seagate® Nytro™ XP6500 Software User Guide*.

---

## Chapter 3: Characteristics

This chapter presents characteristics for each Nytro XP6500 card.

### 3.1 Nytro XP6500 Card Characteristics

The Nytro XP6500 card uses a low-profile, half-height, and half-length PCIe board.

The Nytro XP6500 card uses a SAS3108 controller with drive firmware that runs on its internal processor. The Nytro XP6500 card can be used for either persistent or nonpersistent data and offers high-performance with low latency and a low CPU burden.

The following figure shows the Nytro XP6500 card.

**Figure 9 Nytro XP6500 Card**

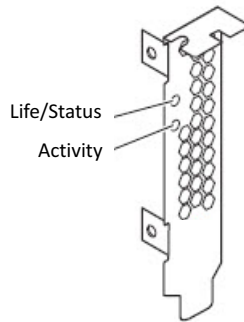


#### 3.1.1 LEDs

Two board-mounted, right-angle LEDs shine through holes in the PCI bracket: one is for drive activity and one is for life/status.

#### 3.1.2 Troubleshooting the Nytro XP6500 Card

The LEDs provide key status information to diagnose a problem with the Nytro XP6500 card. You can also contact Technical Support. The following figure shows the LED layout.

**Figure 10 Nytro XP6500 Card LED Diagram**

The following table shows LED Descriptions:

**Table 2 Status Indicators on a Running System**

Name	Color	LED Description
Activity	Green	<b>On, steady</b> – LED stays steady green when there is no activity. This LED blinks off during drive activity.
Life/Status	Green	<b>On, steady</b> – Normal. The card has sufficient life remaining for programming and erasing the Flash memory. No action is required.
	Amber	<p><b>On, steady</b> – Warning. At least one Flash drive is reporting a high temperature warning.</p> <ul style="list-style-type: none"> <li>Card has approximately 20%, or less of life remaining for programming and erasing Flash memory. Plan to replace.</li> </ul> <p><b>Other component issues:</b> Run the <code>show all</code> and <code>health</code> commands in the command line interface to determine which component has an issue.</p>
	Red	<p><b>On, blinking</b> – Firmware code issue:</p> <ul style="list-style-type: none"> <li>Run the command line interface utility to determine which component has an issue.</li> <li>If no information appears, power cycle the system and retry.</li> <li>If no information appears, contact <a href="#">Seagate Technology Support Services</a>.</li> </ul> <p><b>On, steady</b> – One of the following conditions applies:</p> <ul style="list-style-type: none"> <li>Card has 10% of life remaining. Backup and copy data into a new card immediately.</li> <li>Either the SuperCap is missing or is in warning.</li> <li>One or more of the flash modules has failed.</li> <li>At least one of the flash modules has reported critical temperature.</li> <li>Back-up power rail monitor failure detected.</li> </ul> <p><b>Other component issues:</b> Run the <code>show all</code> and <code>show health</code> commands in the command line interface to determine which component has an issue. Refer to <i>Seagate Nytro XP6500 Flash Accelerator Cards Software User Guide</i> for the precise commands to use here.</p> <p><b>CAUTION</b> If the critical temperature warning persists, you might damage your card. Increase cooling speed or shut down your system to prevent damaging the card.</p>

If you experience a problem with your Nytro XP6500 card that you cannot resolve, report it to your FAE or, if you obtained the product from an OEM, report it to the OEM. Keep these tips in mind when reporting a problem:

- Clearly identify and report the part number listed on the label, and clearly identify the board revision.
- Describe the steps leading up to the error.
- Report the operating system version and the host driver version.

### 3.1.3 Power Consumption for the Nytro XP6500 Card

The Nytro XP6500 card receives power from the PCIe 12-V power rail.

Use the following data for power consumption.

**Table 3 Power Consumption for the 1.5 TB Cards**

Model Number	Idle	Typical Power with I/O	Maximum Power with I/O
XP6500-8A1536LP	23.8 W	35.5 W	41.9 W
XP6500-8A1536FH	23.8 W	35.5 W	41.9 W

**NOTE**

Typical power was measured with data I/O of 8-KB, random data, random access, 30% write, 70% read, 256 Queue Depth, 17% Over Provisioning. Maximum power was measured with data I/O of 4-KB, random data, random access, 0% write, 100% read, 256 Queue Depth, 17% Over Provisioning. Idle power was measured with no data I/O.

### 3.1.4 Thermal Considerations

The board is designed to operate in an environment defined by the following parameters:

- Temperature range: 5 °C to 45 °C
- Relative humidity range: 5% to 90% noncondensing
- Maximum wet bulb temperature: 28 °C
- Minimum airflow: 550 LFM
- Maximum operating altitude: 3000 m
- De-rate: 2°C per 1000 m above 1000 m

The board is designed for the following storage and transit environmental parameters:

- Temperature range: -10 °C to 60 °C
- Relative humidity range: 5% to 95% non-operating, 20% to 80% operating

#### 3.1.4.1 Maximum Sensor Temperature

System design and cooling capacity variations can affect the actual airflow delivered to the Nytro XP6500 cards. System-level fan speeds might require adjustment to make sure that the Nytro XP6500 sensor temperature does not exceed the maximums. The maximum sensor temperature for the Flash modules on the Nytro XP6500 cards is 76 °C.

## 3.2 Electromagnetic and Environmental Specifications

The Nytro XP6500 card is designed to minimize electromagnetic emissions, susceptibility to radio frequency energy, and the effects of electrostatic discharge. The card carries the CE mark, RCM, Canadian Compliance Statement, KCC, Taiwan BSMI, Japan VCCI, and FCC Class B, and the card is marked with the FCC Self-Certification logo. The card also meets the requirements of CISPR Class B.

## 3.3 Safety Characteristics

All Seagate PCIe boards meet or exceed the requirements of UL flammability rating 94V-0. Each bare board is marked with the supplier's name or trademark, type, and UL flammability rating. Because these boards are installed in a PCIe bus slot, all voltages are below the SELV 42.4-V limit.

## 3.4 China Restriction of Hazardous Substances (RoHS) Directive

中国限制危险物品的指令

This product has an Environmental Protection Use Period (EPUP) of 20 years. The following table contains information mandated by China's "Marking Requirements for Control of Pollution Caused by Electronic Information Products" Standard.



该产品具有20年的环境保护使用周期（EPUP）。下表包含了中国“电子产品所导致的污染的控制的记号要求”所指定的信息。

Name of Parts 部件名称	Toxic or Hazardous Substances or Elements 有毒有害物质或元素					
	Lead 铅 (Pb)	Mercury 汞 (Hg)	Cadmium 镉 (Cd)	Hexavalent Chromium 六价铬 (Cr6+)	Polybrominated Diphenyl 多溴联苯 (PBB)	Polybrominated Diphenyl Ether 多溴二苯醚 (PBDE)
PCBA	X	0	0	0	0	0
Chassis	X	0	0	0	0	0

"0" indicates the hazardous and toxic substance content of the part (at the homogeneous material level) is lower than the threshold defined by the China RoHS MCV Standard.

“0”表示该部件（于同类物品程度上）所含的危险和有毒物质低于中国RoHS MCV标准所定义的门槛值。

"X" indicates the hazardous and toxic substance content of the part (at the homogeneous material level) is over the threshold defined by the China RoHS MCV Standard.

“X”表示该部件（于同类物品程度上）所含的危险和有毒物质超出中国RoHS MCV标准所定义的门槛值。



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