

Netcell Corporation

Revolution Storage Processing Card

USER'S MANUAL



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Netcell Storage Processing Card User's Manual

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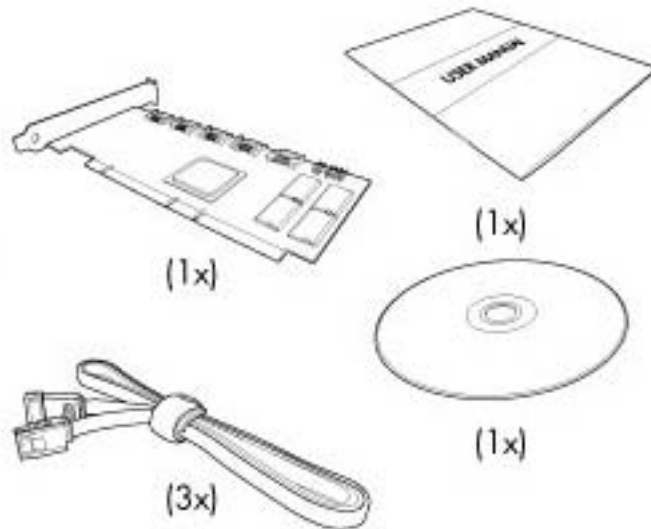
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Introduction

Thank you for purchasing a Revolution storage processing card (SPC) based on Netcell's Revolution storage processing unit (SPU). The Revolution storage processing card is ideally suited for multimedia, game and video content creation applications and enables a new class of multimedia streaming and acceleration using ordinary Serial ATA disk drives. The Revolution storage processing card uses a completely driverless design so that it can natively operate within standard Windows® XP/2000/2003 environments. The Revolution storage processing card's striped-parity RAID 3 mode provides the highest performance protected RAID mode in the industry, providing RAID 0 performance with RAID 5 class parity protection with its integrated hardware XceleratOR™ engine.

Package Contents:

- ◆ Netcell Revolution storage processing card
- ◆ User's Manual
- ◆ 3 or 5 Serial ATA cables
- ◆ Auto-run CD, which includes:
 - Netcell Storage Manager application for Windows® XP/2000/2003
 - Firmware Update utility
 - This User Manual



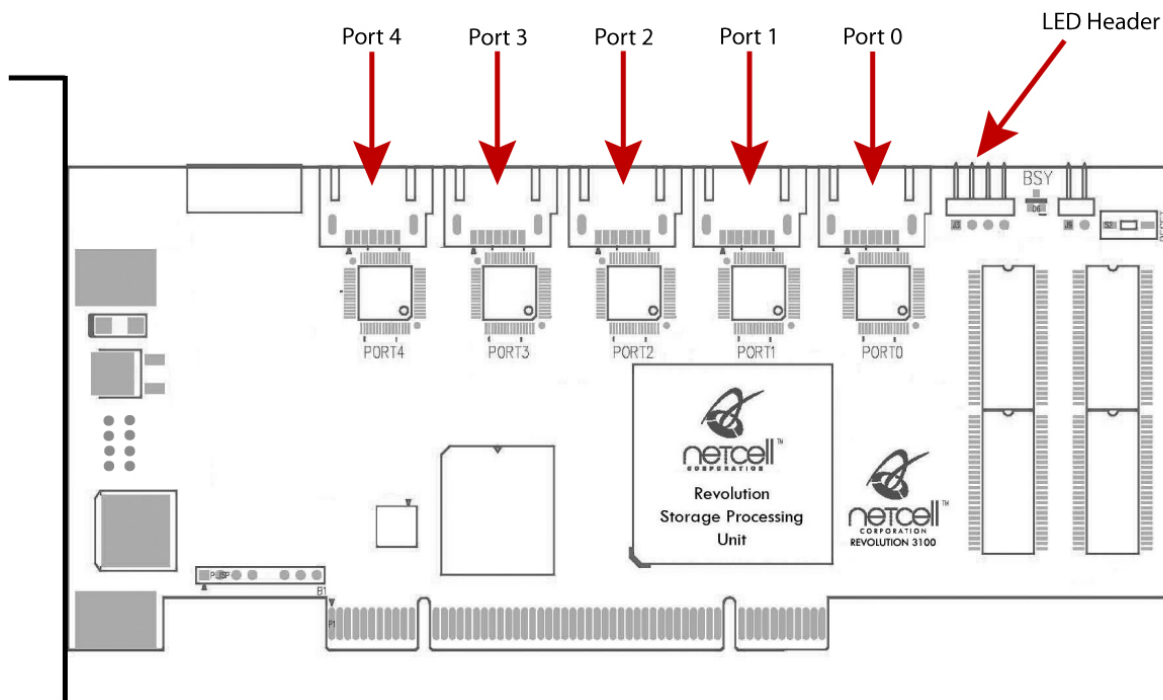
Updates

Please visit www.netcell.com for the latest version of this user manual, other useful information, and software updates.

System Requirements

- ◆ Windows® XP with Service Pack 1a or later, Windows® 2K with Service Pack 3 or later or Windows® 2003. **Note:** Windows® 95, 98 or ME are **NOT** supported.
- ◆ Available 32-bit or 64-bit PCI
- ◆ Standard Serial ATA 150 MB/Sec compatible hard drives.
- ◆ 1.5Mbytes of free system boot drive disk space for the Netcell Storage Manager application
- ◆ A good quality Power Supply (A minimum of 350 Watts for a system with 3 drives, and 450 Watts for a system with 5 drives) and adequate cooling and air circulation is **HIGHLY** recommended. *Note:* Power requirements are highly dependent on the other components in your computer.

Card Layout



Revolution Storage Processing Card with PCI 32-bit Interface (SR3100, SR5100 series)

The Netcell Revolution Storage Card comes with 3 or 5 ports which are located along the top edge of the card. The ports are numbered 0 to 4 from right to left.

Installing your card

If you have everything ready (card, drives, cables), this process should take between 10 and 20 minutes to complete depending on your experience level with PCs.

Note: This process may take longer depending on other peripherals installed.

- i. Open the PC case following the appropriate guidelines provided by your PC or PC case vendor.
- ii. Ensure that there is adequate cooling and power for your hard drives. A drive cage with additional cooling fans is recommended.
- iii. Plug the Netcell storage processing card into an available PCI slot and secure the card bracket to the PC case.
- iv. Connect the drives to the Netcell storage processing card using the provided cables. (note: If you plan to use the Data Migration feature to transform your current hard drive into an array, plug your current drive into the storage processor card.
- v. Close the case ensuring that all the cables are properly secured.

Creating Your Array

If you are making a new array with all new drives, go to **“Creating a new array”**. If you want to transform your existing boot drive into an array, go to **“Transforming your current drive”**.

Creating a new Array

Step 1: Auto Configure your drives

After you attach your new hard drives and first power up the computer, the Storage BIOS will automatically recognize the new drives and recommend the best configuration. Press “Y” configure as recommended, or any other key to skip this step and configure with the Storage Manager.

```
Netcell Revolution Bus 04 Device 02, v1.7.2.1

Detected the following drives:
  Port 0: WD740GD   74G
  Port 1: WD740GD   74G
  Port 2: WD740GD   74G

*** WARNING: Un-configured drive(s) detected

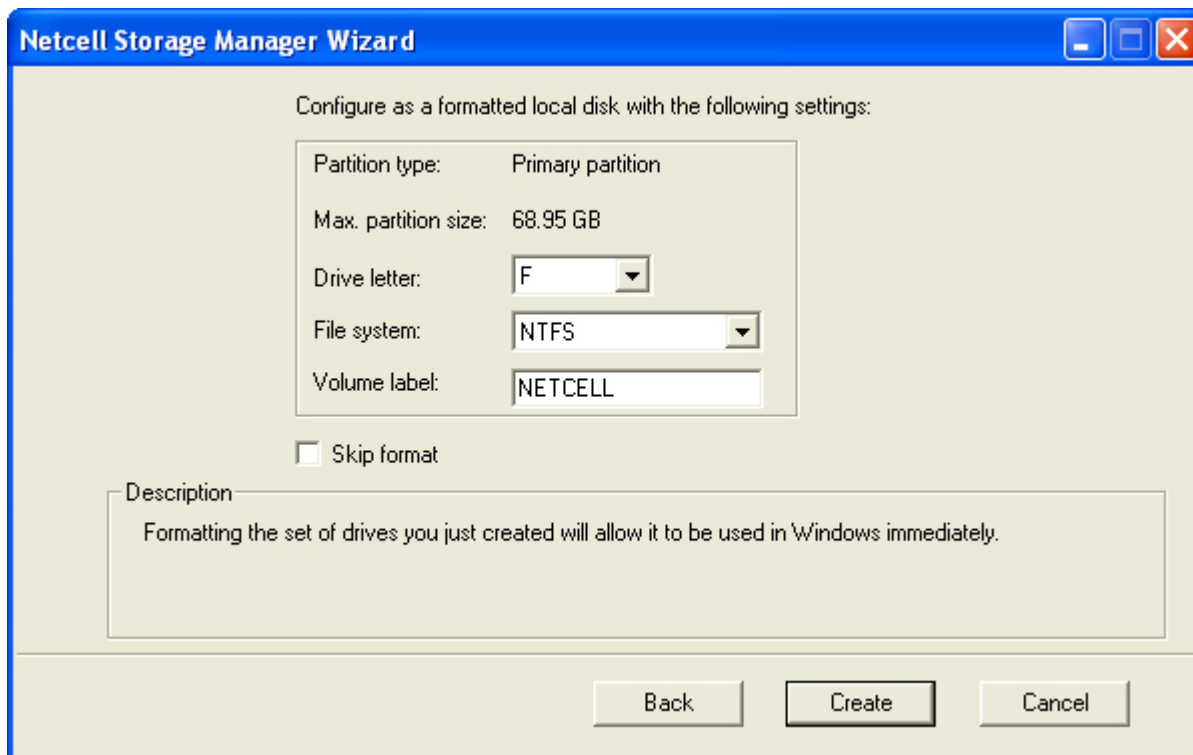
Hit Y to configure as 148 GB RAID 3 (Recommended)
[30]. . . .
```

Step 2: Install Storage Manager

Insert the Installation CD into your CD tray. The installer should auto launch. Follow the prompts to install the Storage Manager. The installer will then prompt you to restart your computer.

Step 3: Format drives

After your computer restarts, the Storage Manager will auto launch a wizard that will help you format your new array.



Transforming Your Current Drive

The software that comes with your Storage Manager includes a Data Migration feature that allows you to take your current hard drive and transform it into an array.

Step 1: Attach current data drive

To use this feature, first ensure that the data or boot hard drive you want to migrate into an array is attached to the storage processing card, and that the additional blank hard drives you will use to make the array are also attached.

Step 2: Auto Configuration

After you attach the hard drives and first power up the computer, The Storage BIOS will automatically recognize the data drive and configure it so it can be used.

Netcell Revolution Bus 04 Device 02, v1.7.2.1

Detected the following drives:

Port 0: WD740GD 74G Used (Boot)
Port 1: WD740GD 74G
Port 2: WD740GD 74G

Configuration in progress. Please stand by . . .

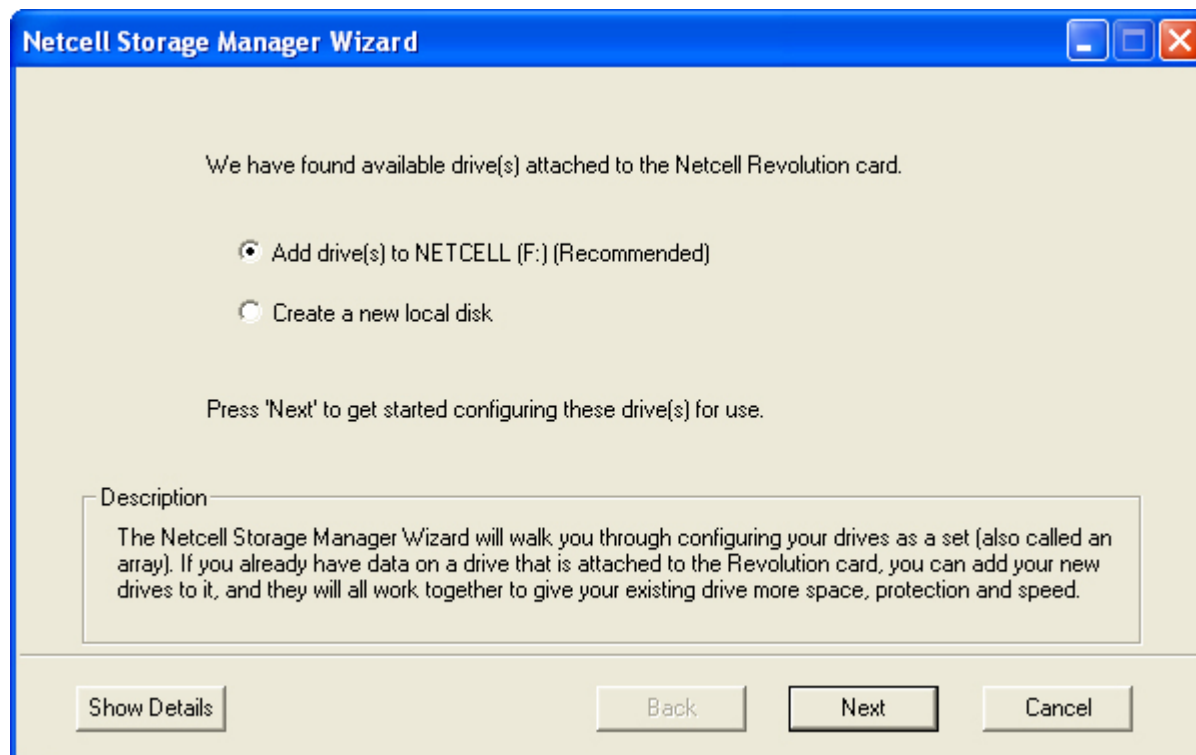
Step 2: Install Storage Manager

Insert the Installation CD into your CD tray. The installer should auto launch. Follow the prompts to install the Storage Manager. The installer will then prompt you to restart your computer.

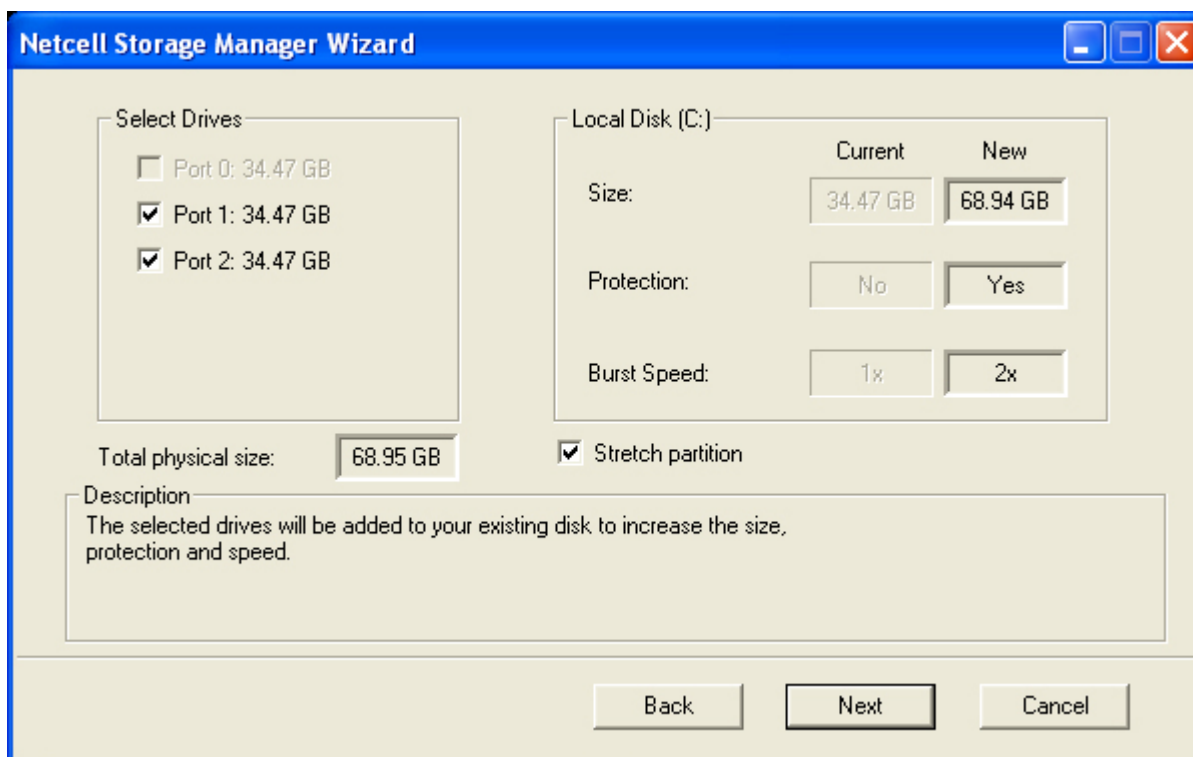
Step 3: Storage Manager Wizard

After you reboot your computer, the storage manager will automatically detect that there are new drives attached to the card, and will launch a wizard to help you configure these drives.

First, select whether you want to make a new array out of your hard drives, or add the new drives to a drive that already has data on the card, and make them all work together.



The next screen lets you select which drives you want to add to your current drive. You can select and deselect drives on the left, and see which option best matches your needs. The recommended option is selected by default.

A screenshot of the 'Netcell Storage Manager Wizard' window. The window has a blue title bar with the text 'Netcell Storage Manager Wizard' and standard Windows window controls. The main area is divided into two panes. The left pane, titled 'Select Drives', contains three checkboxes: 'Port 0: 34.47 GB' (unchecked), 'Port 1: 34.47 GB' (checked), and 'Port 2: 34.47 GB' (checked). Below these is a text box labeled 'Total physical size:' containing the value '68.95 GB'. The right pane, titled 'Local Disk (C:)', contains three rows of settings: 'Size:' with 'Current' as '34.47 GB' and 'New' as '68.94 GB'; 'Protection:' with 'Current' as 'No' and 'New' as 'Yes'; and 'Burst Speed:' with 'Current' as '1x' and 'New' as '2x'. Below these is a checkbox labeled 'Stretch partition' which is checked. At the bottom of the right pane is a text box labeled 'Description' containing the text: 'The selected drives will be added to your existing disk to increase the size, protection and speed.' At the bottom of the window are three buttons: 'Back', 'Next', and 'Cancel'.

After you click "Next" there will be a confirmation screen. Check 'I agree' and 'Start' to begin the migration. Note that the migration option cannot be cancelled once it has begun. The process will take some time, but you can continue to use your computer as normal during this process, including shutting down or restarting your computer. To see the full capacity after drives have been added, you must reboot your PC.

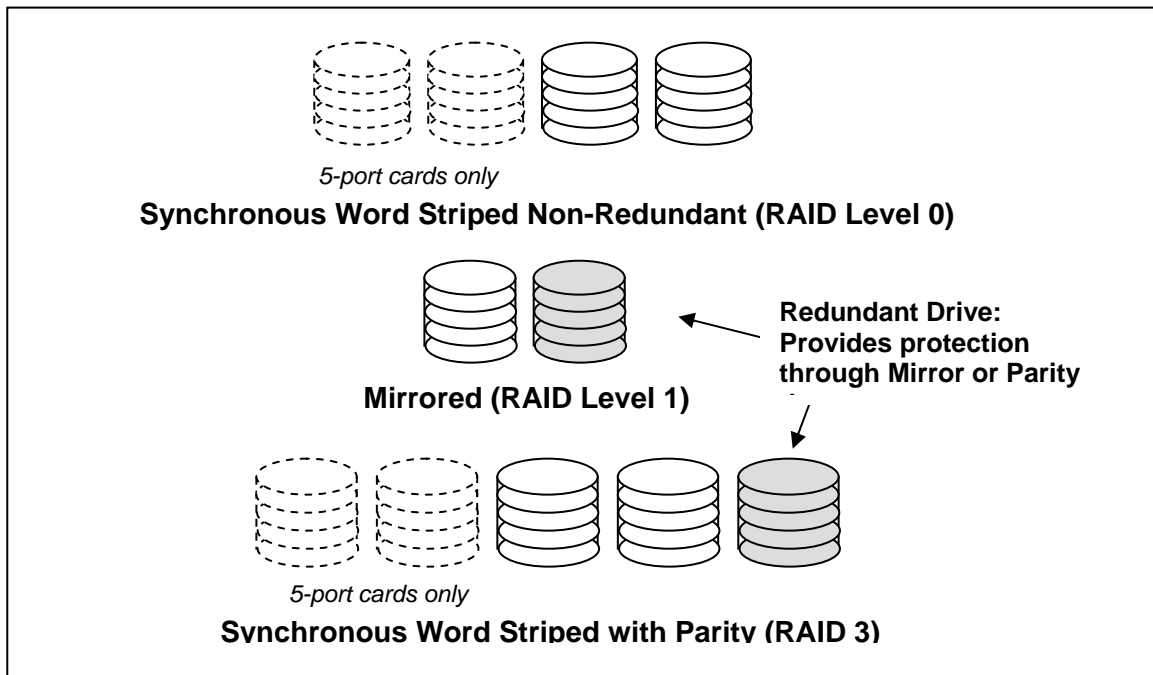
RAID Types and Benefits

Overview of RAID types

The Netcell storage processing card supports 3 forms of RAID, each suitable for different applications.

- RAID 0** Used for performance striping only. Risk of data loss increases linearly with the number of drives striped. The user sees 100% of the sum of all the drive capacities added together.
- RAID 1** Used to protect a single drive by copying all data simultaneously to a mirror drive. The user sees only the capacity of one drive.
- RAID 3** Used to protect a performance stripe from drive failure. Adding an additional drive of equivalent size to the striped drives protects the data on the striped drives. This additional drive is used to store protection information that allows data to be reconstructed, on-the-fly, from any one of the drives used in the array. The user sees the capacity as the sum of all drive capacities added together less the capacity of the drive used for protection information.

RAID Levels: 0, 1, 3



Effective Utilization of Drives

Using RAID 0 only is a cost effective way to increase performance by allowing data to be read and written faster. However, RAID 0 increases the risk of losing data as there is no protection mechanism employed. Mirroring or RAID 1 is used to protect a user from losing data from a single drive failing, but 50% of the capacity is lost to the mirrored copy. RAID 3 provides the maximum performance and protection by using only a single drive to protect several data striped data drives. RAID 3 provides the benefits of striped performance and protection using an on-the-fly protection engine. Netcell highly recommends using the RAID 3 configuration to fully protect all data stored on the array from a single drive failure, especially digital camera images, downloaded music files or captured video files that may not be backed up to another location of media.

Supported RAID Configurations

The Netcell Revolution storage processing card supports multiple array configurations for maximum flexibility. Each array may be used either as an additional storage drive in your system or as the boot drive.

An array consists of multiple disks, but appears to the host as a single large drive. For example, if you have three ATA 100/133 (UDMA 5 mode) drives configured in a RAID 3 configuration, each of capacity 200 Gigabytes, the host will see a large single 400 Gigabyte drive (two for data and one for protection, the latter being invisible to the user). Each RAID 3 drive will be mapped by the host as single disk number (e.g. Disk 0, Disk 1).

Supported RAID Configurations

# of Drives	RAID Level	Model	Type	Definition
1	N/A	All	Single/JBOD	Individual drive (JBOD up to 2 or 4 drives – 3000/5000)
2	0	All	Non-Redundant Striped	Striped with no protection against drive failure
2	1	All	Mirrored	Protected using mirrored drive
3	3	All	Parity Striped	Striped with protection against drive failure using fixed parity drive
4	0	5-port cards only	Non-Redundant Striped	Striped with no data protection
5	3	5-port cards only	Parity Striped	Striped with protection against drive failure using fixed parity drive

Netcell Storage Manager

The Netcell Storage Manager application provides a convenient and easy to use Windows interface that supports monitoring, status checking, creation, deletion, rebuild and advanced options for your Netcell Revolution storage processing card.

Install/Un-install

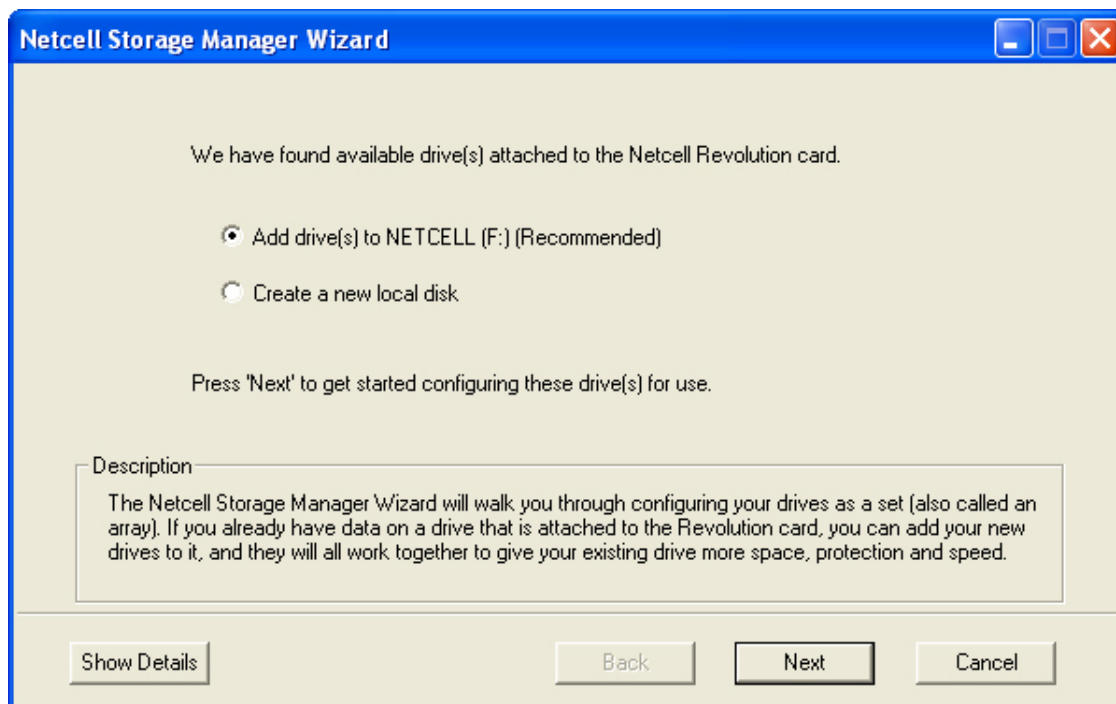
Insert the Netcell Installation CD into the system's CD-ROM or DVD-ROM drive. The installation should auto start. If not, from the Start menu, navigate via the Run menu to the setup.exe program on the CD and run setup.exe. Un-install of the application can be performed by re-running setup.exe or re-inserting the installation CD and selecting the "remove" option.

Use the default options to install the application and then reboot the system.

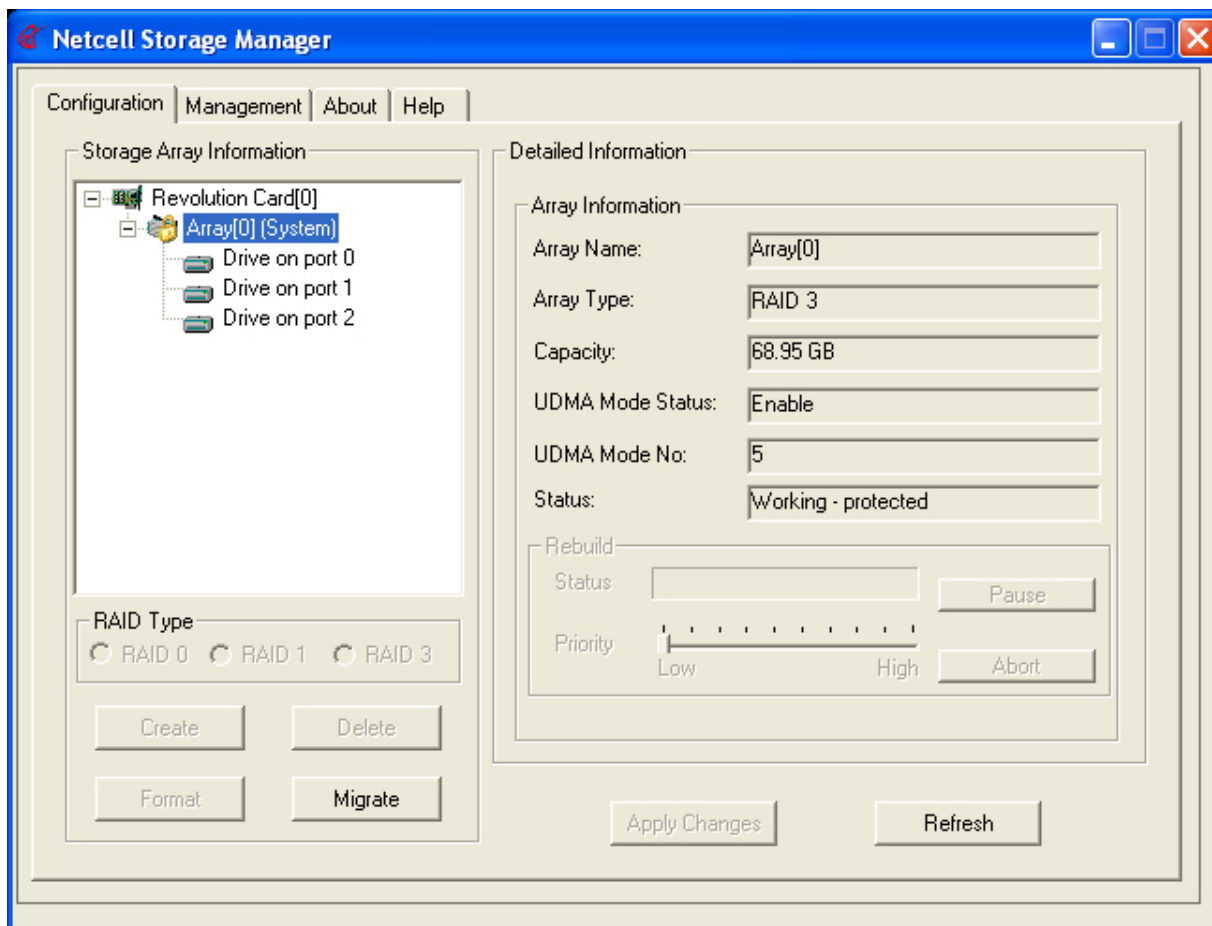
The application auto loads after a Windows restart and log-on by the user. It can also be run by navigating to the Start Menu → Programs → SyncRAID Utility directory and selecting the "Netcell Storage Manager" application icon or by clicking on the desktop shortcut created during CD auto installation.

Storage Manager Wizard

The Netcell Storage Manager includes a wizard that will detect when you attach new drives to your storage processing card, and will automatically recommend configurations for you. This wizard can be cancelled at any time. See 'creating your array' for more detail on how to use the wizard.

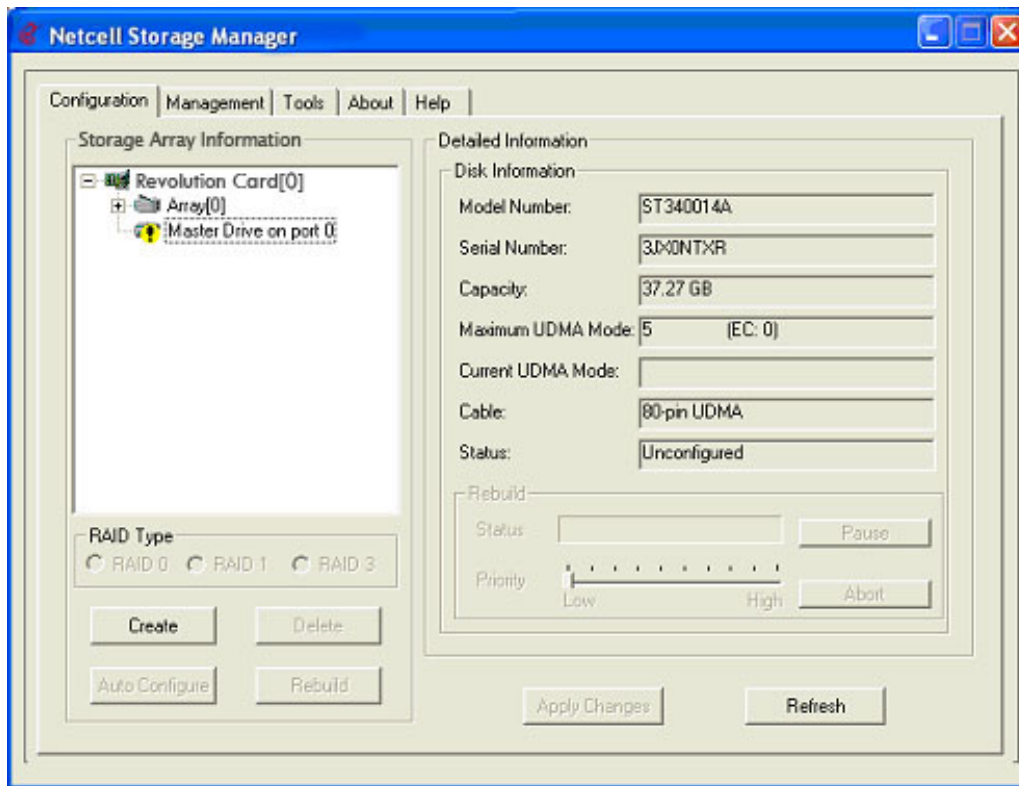


Storage Manager Interface



The Configuration Menu is used to check the status of the card, arrays and drives by selecting the appropriate icon in the left hand window. To see detailed information about your arrays or drives, go to the management tab and select "Show Detailed Drive and Array information", then select the desired array or drive in the configuration interface. As each icon is selected, the status is shown on the right hand side. EC stands for Error Count; this number indicates the errors (Read, Write or time out) encountered by the Netcell Revolution storage processing card while accessing that drive.

An array with a bootable OS on it will be marked with a lock, these arrays cannot be deleted in the Storage Manager, but must be deleted in the Storage BIOS to help prevent accidentally crashing your system.



Creating Arrays Manually

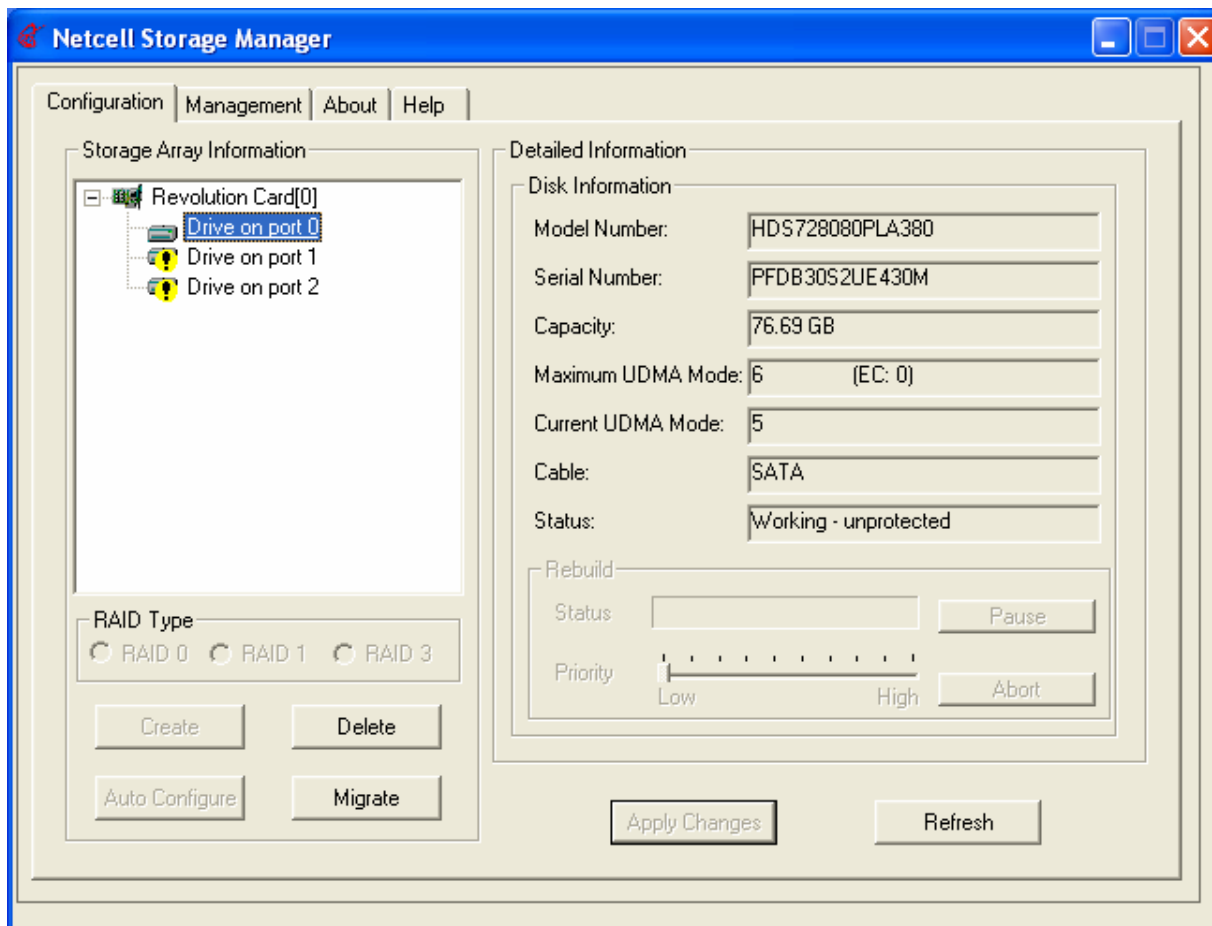
! To create an array, simply select individual un-configured drives (drives marked with a yellow exclamation sign) using a left mouse click while holding the **CTRL** key. If all drives are being assigned to a single array, simply select the top drive and while holding the **SHIFT** key, select the bottom drive, which results in all the drives being selected.

The types of RAID modes available with the selected drives will become highlighted in the RAID Type window, just below the drive selection window (i.e. if 3 or 5 drives are selected; only the RAID 3 button will highlight as RAID 0 or RAID 1 configurations are not possible with 3 or 5 drives). Select the RAID type and then click on "Create" to form the chosen array.

After the arrays are created, select "Apply Changes" to configure the card. This will also cause the operating system to rescan the hardware to make sure that the new drives are recognized. Note, in some cases, it may be necessary to restart the system to ensure that Windows correctly recognizes the array, especially if arrays have been created and deleted several times.

Manual Data Migration

Data migration allows you to add hard drives to a single drive, or set of drives attached to the Revolution card, to change the type of RAID, and increase it's size, protection, and speed (benefits will vary, depending on what type of RAID is selected).



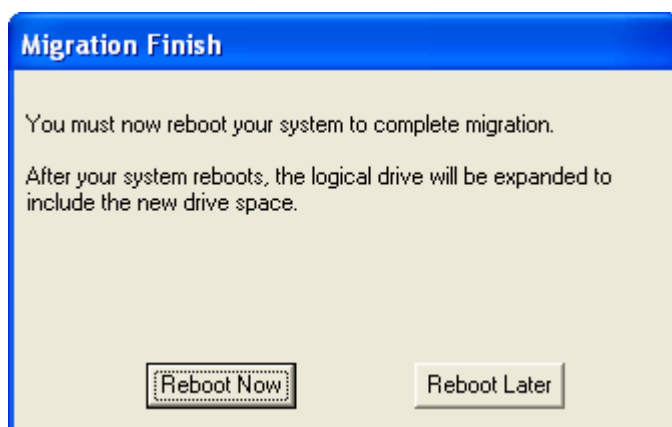
To migrate your data, first make sure that the array you wish to convert and the un-configured drives you want to add to the array are both attached to the card and show up in the Netcell Storage Manager. Select the array. If un-configured drives are found, then the 'Migrate button' will become available.

After you click on the Migrate button, the migrate dialogue will appear. Select the drives you wish to add to the array, the types or RAID mode you will end up with will become highlighted in the RAID Type window at the bottom of the migrate dialogue. At the bottom of the window, there is a box for Partition Stretching Options. If you select 'Automatically expand partition' the Netcell Storage Manager will stretch the last logical disk on the array to include your new space. If this option is available, we recommend you press yes. If this option is not available or you choose not to use it, you will need to go to the windows Disk Manager to configure any new space you have as a result of the migration. After you have finished your selection, press Start to begin the migration.



This operation cannot be cancelled once it has begun. The process may take several hours, but you can continue to use your computer as normal during this process, including shutting down or restarting your computer. If your new array has additional capacity, you must reboot your PC after migration completes before the computer will see the new space.

After the migration finishes, the following message will appear to prompt you to restart your computer to finish the migration.



Deleting Arrays



Important Note: Deleting an array will cause all data to be lost from the drives. If you accidentally delete an array, do not press “Apply Changes”. Use the “Refresh” button to display the current card configuration again which will restore the original array setting to the application.

To delete a pre-existing array, select the array icon to be deleted and click on “Delete”. You will be asked to confirm deletion. The drives will become unassigned and will be available to create a new array.

Failed Drives, Degraded Arrays and Rebuilds



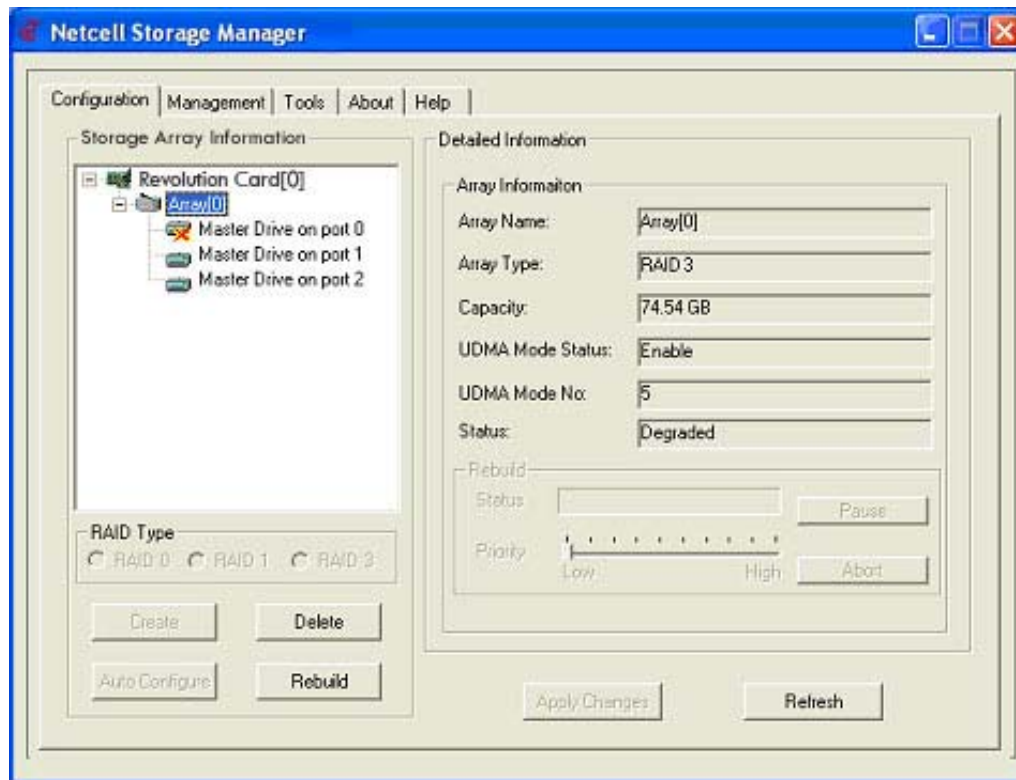
When a drive fails in a protected array, the array will continue to function without performance degradation in a RAID 1 or 3 configuration. However, the array is unprotected or “degraded” in this state and a further drive failure will result in the total loss of the array and the data contained in it. The array can be fully restored with a drive replacement and rebuilt if protected with a mirror or parity drive.



Important Note: RAID 0 arrays cannot be recovered as they do not contain a protection stripe or mirror.

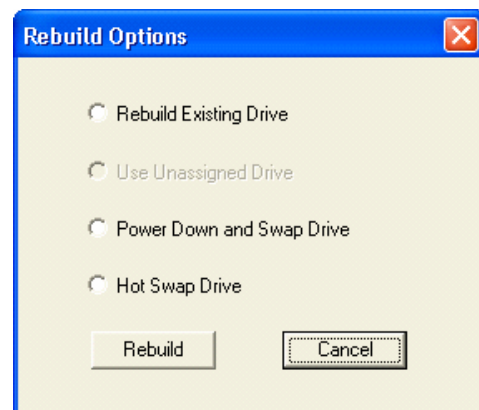
There are several indications of a drive failure:

1. During the system boot, the ***** Revolution sign-on message will show a message “Arrays require drive change”.
2. Within the Revolution BIOS Setup utility, one of the drives will have an “#” by it.
3. When the Netcell Storage Manager application is running:
 - a. A pop up window will indicate a drive failure
 - b. If the email notification is enabled in Management menu, An email will be issued indicating the failure
 - c. One of the drives will have a red X through it.

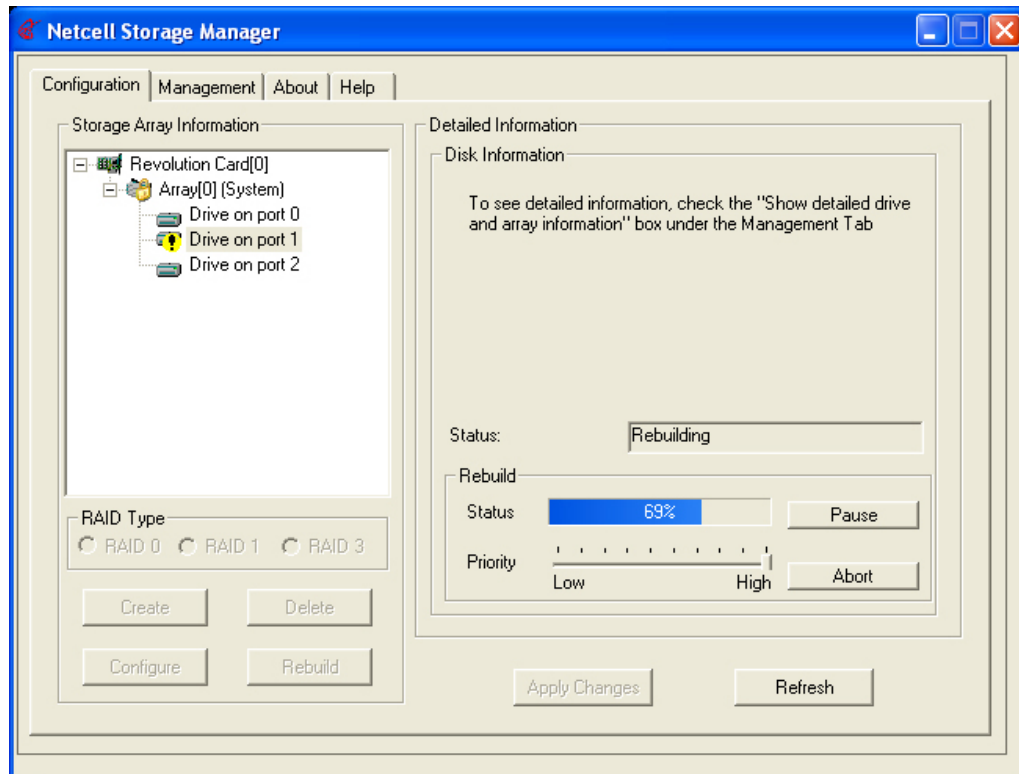


To replace and rebuild a failed drive, perform the following steps:

1. Determine which array and drive has failed by looking at the "Status" indicator in the "Detailed Information" window by selecting the array with the failed drive (status will appear as degraded). The drive with the red X through it is the failed drive. Make a note of the port number as you will need it to determine which physical drive needs replacing (note: refer to the card layout diagrams earlier in this user manual)
2. Select the failed drive by left clicking on it. The "Rebuild" button will now become available just beneath the main information window. Click on Rebuild.
3. Up to four options will appear that require a selection prior to clicking on the sub menu "Rebuild" button:
 - a. **Rebuild Existing Drive:** Use this option if the error was not caused by the drive failing i.e. it was accidentally un-plugged and it is ok.
 - b. **Use Unassigned Drive:** This option takes an existing unassigned drive and inserts it into the array, then rebuilds. If a drive was accidentally unplugged, and the computer is power cycled before it is inserted, the drive may show up as an unassigned drive.



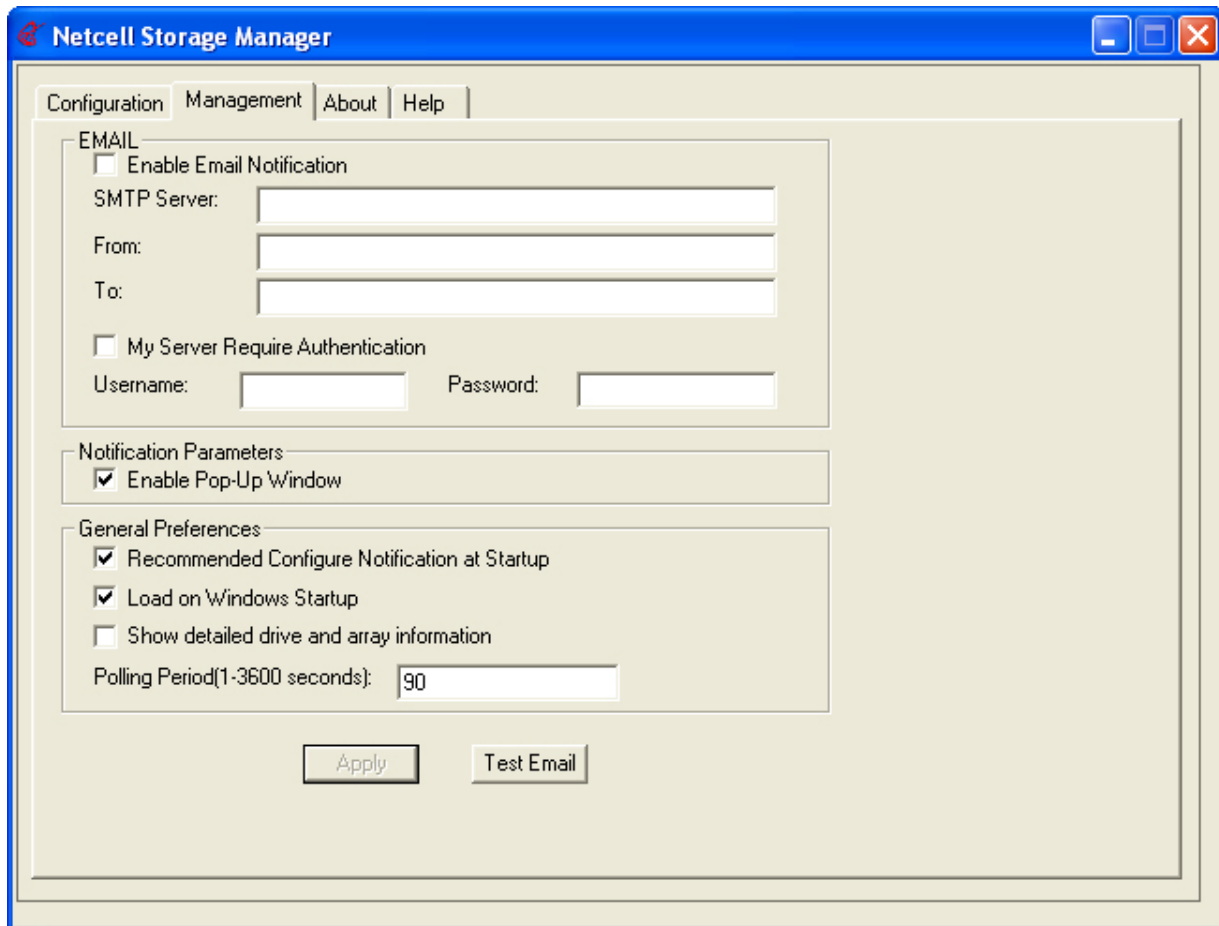
- c. **Power Down and Swap Drive (cold swap):** If your drives are not accessible or you are required to power off in order to replace it, use this option (recommended for all drives unless indicated as hot plug capable and contained within an enclosure that supports hot plug). You will be prompted to shutdown the system and replace the drive.
- d. **Hot Swap Drive:** You will be prompted to remove the current drive and replace it with a compatible drive (only used if the drive supports hot swap).



4. In each case, clicking on Rebuild will cause the newly replaced drive to be rebuilt with data from the existing good drive(s) in the array. While rebuilding, the array can be fully utilized by the system. The status and progress of the rebuild can be viewed by selecting either the array or drive. The Netcell Storage Manager application does not need to be open for rebuild to continue to completion. In addition, the PC may also be powered off if necessary. The rebuild will resume once the system is powered back on.
5. Rebuild times can be reasonably long, especially with the larger disk drives. During rebuild, several specialized function buttons are available:
 - a. **Pause** – allows the process to be temporarily paused. This is useful if you need to obtain maximum performance from the system and want to delay the rebuild for a while. The pause button changes to a “Resume” button to restart the process.
 - b. **Abort** – aborts the rebuild process and resets back to the unprotected failed drive state for restart or total reconfiguration.

- c. **Priority slider** – dictates the level of priority the Revolution storage processing card gives to the rebuild. The slider bar may be dragged by clicking on it with the mouse and moving it while holding the left mouse button down. Rebuild priority is high by default which can degrade performance of the array. Setting low priority frees resources but may take much longer to complete the rebuild.
- d. **Skip Error/Resume** – allows the user to skip an error and continue with rebuild. The errors during rebuild are commonly from reading unused areas of the good drives, may have nothing to do with the failed drive. These errors can be skipped in order to complete a rebuild. After the rebuild is completed, user must check the EC (Error Count) by clicking on individual drive to assess the health of an individual drive, high count warrants replacement of that particular drive.

Management Options



The screenshot shows the Netcell Storage Manager application window with the 'Management' tab selected. The window has a blue title bar and standard Windows window controls. The main content area is divided into several sections:

- Configuration** (selected), **Management**, **About**, **Help**
- EMAIL** section:
 - ☐ Enable Email Notification
 - SMTP Server:
 - From:
 - To:
 - ☐ My Server Require Authentication
 - Username: Password:
- Notification Parameters** section:
 - ☒ Enable Pop-Up Window
- General Preferences** section:
 - ☒ Recommended Configure Notification at Startup
 - ☒ Load on Windows Startup
 - ☐ Show detailed drive and array information
 - Polling Period(1-3600 seconds):
- Buttons: **Apply** and **Test Email**

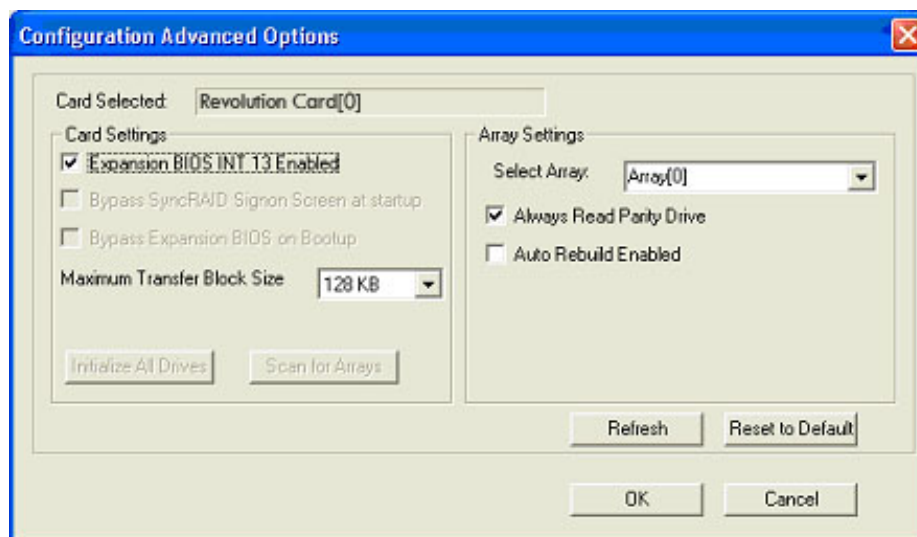
The application provides two primary options for notifying the user of a drive failure as summarized in the rebuild section. These include a simple pop up window and an email notification. These may be set up under the Management tab of the application as shown on the right.



Important: The monitoring options are only in effect while the application is running.

The option “Load on Windows Start” ensures that the application starts with Windows. If not checked, there is a risk that the drive failure will go undetected.

Advanced Setup Options



The utility provides three options for advanced users.

1. The Expansion BIOS INT 13 Enabled: When not checked (i.e. disabled), turns off the part of the BIOS that registers the arrays as bootable with the operating system. This can resolve some system boot conflicts, especially with motherboards that employ SCSI drives as the main boot drive. This option is checked by default in the utility enabling arrays on the Netcell Revolution storage processing card to act as a bootable device. For more information about INT 13, see point 4 in the Troubleshooting section.
2. Bypass Expansion BIOS on Boot up: When checked, turns off the BIOS completely, allowing the Netcell Revolution storage processing card to bypass its initialization BIOS and jump straight to the runtime firmware. This can solve boot conflicts especially when several Netcell Revolution storage processing card's are installed in the system. Un-checking this box will turn on the BIOS after a shutdown.
3. Always Read Parity Drive (3 mode only): The Netcell Revolution storage processing card defaults to reading the parity drive in RAID 3 mode to maintain a balance across the drives. This feature can be turned off by un-checking it in the utility which will speed up array access. This does not affect the capability of the array to continue functioning when a single drive fails.

Updating Your Firmware

The Netcell Storage Manager includes a utility that will automatically check for updates to your storage processing card firmware when you first install it. You can also download update packages manually from the website at www.netcell.com/support.html. Please follow the directions that come with the update packages to ensure a smooth update.

Netcell Storage BIOS (CTRL+N)

The Netcell Revolution BIOS Setup utility provides a convenient and easy to use interface to create an array in a pre-Windows environment. The Storage BIOS is recommended for advanced users. All of the functions in the Storage BIOS are available in the Netcell Storage Manager.

Auto Configuration

After the card has been installed and the system has been started, a screen will appear during boot up showing the current drives in the array. This screen will show the attached drives with their capacities. It will also recommend an array configuration to the user based on the available drives.

```
Netcell Revolution Bus 04 Device 02, v1.7.2.1

Detected the following drives:
  Port 0: WD740GD   74G
  Port 1: WD740GD   74G
  Port 2: WD740GD   74G

*** WARNING: Un-configured drive(s) detected

Hit Y to configure as 148 GB RAID 3 (Recommended)
[30]. . . .
```

The user will be prompted to press “Y” to allow the utility to configure the array. After a few seconds the array will be configured and the system will continue to boot. Pressing any other key will bypass this option allowing the user to configure the array manually in the Revolution BIOS Setup utility (as described below) or with the Netcell Storage Manager application in Windows.

Manual Configuration (CTRL+N)

The preferred method to configure arrays is using the Auto Configuration utility at system start up. However, the Netcell Revolution BIOS Setup utility includes tools for advanced users to create or modify new arrays.

Shortly after the main system BIOS and graphics cards complete their boot up process, you will see a sign on screen similar to the following:

```
Netcell Revolution Bus 00 Devices0B, v1.7.2.1
Status: All is well
```


(note: You may see different bus, device and firmware version number depending on which slot your Netcell storage processing card occupies, what peripherals you have attached to your computer, and when you purchased your card).

Hold down the "CTRL" and letter "N" (CTRL-N or ^N) key at the same time as soon as the prompt appears to enter the Netcell Revolution BIOS Setup utility. You will see a display similar to that below.

```

Netcell Revolution BIOS Setup for PCI Bus 0B Device 0B, v1.7.2.1
Ar ATA Drive List
-----
A0 0-Maxtor 6E040L0-E1APM9AE
A0 1-Maxtor 6E040L0-E166EKME
A0 2-Maxtor 6E040L0-E166NPVE
A0 3-Maxtor 6E040L0-E166NL6E
A0 4-Maxtor 6E040L0-E166NL2E
U = Unassigned, * = Fault;      Cache size: 128 MB      (c) Netcell 1995-2005

Array Map
Array   Drive Group   Count-Type   Status
-----
A0      M0,M1,M2,M3,M4  5 Drive-Raid 3  Good
A1                                     Array not defined

Setup Menu
1. Create an Array      2. Delete an Array      3. Interrupt 13 (now Enabled)
4. Reset Configuration
5. Save & Exit          6. Exit
Selection: _

```

The top part of the screen (Drive List) shows the available drives connected to the storage processing card. A "U" in the far left column by a drive indicates that it is currently unassigned and may be used either as a single drive or as part of an array.

The middle part of the screen (Array Map) shows the arrays currently defined, along with the drives used to form the array and the array status. This line will indicate if there is an array failure.

The lower part of the screen (Setup Menu) indicates the current user options.

Creating Arrays (option 1)

Use this option to setup arrays.

Follow the prompts to:

- Select an array number to setup
- Select the drives to be assigned to the array
- Select the corresponding array type

(Note: You will only be allowed to select a RAID type that is available for the number of drives chosen. Drives will be assigned in the order they appear on the Drive List. Repeat the above process for any remaining drives or arrays you wish to configure)

After you create the array, save the configuration using option 5.

Deleting an Array (option 2)

Use this option to delete arrays previously configured. The drives will be freed up and will appear as "U" or "un-configured" in the top part of the menu.

Interrupt 13 (option 3)

INT13 enable/disable turns off the part of the BIOS that registers the arrays as bootable with the operating system. This can resolve some system boot conflicts, especially with motherboards that employ SCSI drives as the main boot drive. For more information about INT 13, see point 4 in the Troubleshooting section.

Reset Configuration (option 4)

This option will allow you to reset all of the drives or a single drive attached to the storage processing card. Resetting the drives will delete the array, clear all partitions and delete all of the data on the drives. To complete this operation, you need to save your configuration using option 5. To cancel the reset configuration operation and keep the original configuration settings, you can use either option 6 or option 7 if you have not saved any changes.

Save and Exit (option 5)

Selecting this option will allow you to save all your configuration changes, exit the utility and continue with rebooting the system to Windows.

Exit (option 6)

Exits the Revolution BIOS Setup utility. Using this option will not save any configurations changes made during this session of the BIOS Setup utility.

BIOS Update and Recovery Utility

Netcell provides a DOS utility called SRUpdate which can be used to update or re-flash the BIOS. This utility along with the latest BIOS are available from the Netcell website at: <http://www.netcell.com/support.html>. In order to use this tool, copy the utility and BIOS onto a bootable floppy.

Updating The Firmware

Once the bootable diskette has SRUPDATE and the Firmware (SRxxxx.BIN) on it, insert the diskette into the floppy drive and reboot the system. There will be several options given to the user, including #4 (Update FLASH) as shown below:

```
SyncRAID(TM) Flash Utility Program v1.0.2.1
Menu (PCI Bus - 2, Dev - c):
  1. Display current FLASH version
  2. Display FLASH update file version
  3. Save current FLASH to a file
  4. Update FLASH
  5. Compare FLASH and file
  6. BIOS Recovery
  x. Exit.

Selection: 4 - Update FLASH.
Current FLASH Update file(s) in this directory:
  1. SRxxxx.BIN  06/4/2004  03:08p
  2. SRxxxx.BIN  07/2/2004  02:46p
Select file to use: 2
```

IMPORTANT NOTE: In rare situations, if the SRUPDATE does not find the Netcell Revolution storage processing card, using a jumper on the "PROG FLASH" or 'PF' pins on the Netcell Revolution storage processing card will force the SRUPDATE to find the Netcell Revolution storage processing card and run successfully. If the problem still persists, please contact Netcell for further assistance.

Recovering BIOS

Running the SRUPDATE and choosing option 6 can be used to recover BIOS (i.e. force the System to load Control N at the time of boot up). This is in addition to the Bypass BIOS option available in the Netcell Storage Manager application.

Troubleshooting

Before contacting Netcell with a technical problem, please consult this section and the latest Release Notes and FAQ/Troubleshooting documents on Netcell Website at

<http://www.netcell.com/support.html> to see if your problem can be corrected.

1. Netcell Card Not Recognized or Boot up Screen Not Displayed

- (i) Check all hardware and ensure that the card is correctly installed and seated in its PCI slot
- (ii) If there are too many add-in peripherals installed in the system, a SCSI motherboard boot controller is being utilized or a RAID accelerator driver is installed with a third party controller, it is possible that there is not enough system BIOS resources to correctly configure the card. Try removing some of the other peripherals temporarily or moving the Netcell Revolution storage processing card to another PCI slot to see if this allows the card and drives to be recognized. If the card does become visible i.e. there were too many peripherals, then configure the Netcell Revolution storage processing card and drives with these removed first. If none of the arrays on the Netcell Revolution storage processing card are being used as boot devices, You can disable the Int 13 option in the Netcell Revolution storage processing card BIOS to free system resources. As a last resort, try disabling the BIOS altogether using the "Disable BIOS" option in the BIOS level ^N configuration utility¹.
- (iii) If there are multiple Netcell Revolution storage processing card's in the system and only a single card appears to boot, configure the card that appears and then disable the BIOS. The second card should then appear.

2. BIOS boot up screen visible, but system fails to boot

- (i) Using the BIOS configuration utility, if the array is not being used as a boot device try setting the INT13 flag to disabled. If this does not change the situation, try disabling the BIOS altogether using "Disable BIOS" – see footnote below.

3. Hard Drives Not Recognized Correctly in CTRL+N BIOS or Netcell Storage Manager application

- (i) Ensure that the drives are UDMA 2 (or higher) compatible. Some older drives may not function correctly with Netcell Revolution storage processing card. Also ensure that the correct UDMA compatible cables have been used.

¹ Caution – disabling the BIOS will also disable the CTRL+N configuration utility which can only be reset using the Netcell Storage Manager utility running under Windows, or the SRUPDATE DOS level utility created on the bootable FLASH update floppy.

- (ii) Examine the boot up status line or use the Netcell Storage Manager application to determine if one of the drives has failed and if so, replace the drive. The "Properties" or status information in the Storage Manager application may also indicate a possible problem with the drives. If RAID 1 or 3 mode was used, then use the BIOS or Windows utility to rebuild the new drive to restore the array to complete health.
- (iii) For compatible drives, if this is a first time install and data has not yet been written to the drives, then use the "Initialize All" option in the ^N BIOS to reset the drive settings. Caution – this will erase all prior configuration and data so use carefully.
- (iv) If drives had previously contained data and used with the Netcell Revolution storage processing card, then carefully examine all the hardware connections to ensure that nothing has been disconnected.
- (v) Make sure that you are using a high quality power supply for your system, we highly recommend using around 350 Watt power supply for 3-drive system and around 450 Watt power supply for 5-drive system.

4. Int 13 (This option is enabled by default):

Int 13 is a marker that registers if the arrays you have created are bootable. If it is enabled then your computer will look to see if there is an operating system on any of the arrays on your card. If it is not enabled, then your computer will not look for operating systems on the array. Because Int 13 only affects whether your arrays are registered as bootable, if you are running your arrays as data drives, without any Operating systems on them, you can safely disable Int 13.

Enabling Int 13 can occasionally cause compatibility issues on motherboards. Some motherboards that have SCSI controllers on them have difficulty operating properly when Int 13 is enabled on card, and the SCSI controller is also set as a bootable device. Also on some (generally older) motherboards enabling Int 13 may require you to adjust the boot order in your BIOS.

If you are having difficulties booting with Int 13 enabled, there are two settings in the BIOS you may need to modify, **Boot Order**, and **Hard Drive Priority***. The Boot Order function is the function that enables you to select the order in which the system looks for bootable devices. This will include Hard drive, CD-ROMs, and floppies as options. Often the boot order shown by default will be 1) Floppy 2) CD-Rom 3) Hard Drive. The Hard Drive Priority, if it is available on your motherboard, is a subcategory normally located near to the Boot Order that allows you to list the primary bootable hard drive. Generally, if the Boot Order function on a motherboard lists more than one hard drive available than it will not have a Hard Drive Priority function.

Because every motherboard BIOS is unique, you should refer to your motherboard manual or technical support for the company that made your computer for specifics on how to access the BIOS and modify these settings. If you wish to boot off of the Netcell Revolution storage

processing card, ensure that the Netcell Revolution storage processing card (sometimes referred to as SyncRAID) is the first hard drive listed under Hard Drive Priority, and that it is the first hard drive with a bootable Operating System listed under the Boot Order. If you have Int 13 enabled on the Netcell Revolution storage processing card, but wish to boot off of a drive or array not attached to the card, ensure that the drive you wish to boot off of is the first hard drive listed under Hard Drive Priority, and that it is the first hard drive with a bootable Operating System listed under the Boot Order.

**The exact names of these functions will vary depending on the motherboard, and not all motherboards have Hard Drive Priority. Please refer to your motherboard manual or technical support for your computer if you are unsure of the location of these functions.*

Features and Specifications

Note: The SR3000 and 5000 models do not support ATAPI devices such as CD-ROM or DVD-ROM drives.

Host Bus Interface	3V or 5V PCI 2.2 compliant, 32 bit 33 or 66MHz for SR3000,3100,5103 PCI 2.2 compliant, 64 bit 33 or 66MHz for SR5000 Emulates standard IDE dual channel controller
Drive Interfaces Supported	Ultra DMA 5 maximum rates on ATA 133, ATA100, ATA66, ATA33 Serial ATA 150MB/sec
Industry Standards Supported	ANSI T13.1321D/1410D
Drive/RAID Support	JBOD (2 drives for SR3000 and SR5000 series) RAID 0 striping (2 drives SR3000 series and 4 drives SR5000 series) RAID 1 mirror (2 drives) RAID 3 striped parity (3 or 5 drives)
Storage Processing Unit ¹ <ul style="list-style-type: none"> NC3000 SPU (for SR3000 models) NC5000 SPU (for SR5000 models) 	100% RAID offload from host CPU 800Mbytes/s internal 64bit DMA engines Drive roaming using meta data Auto failover on drive failure (3 mode) Rebuild with low to high priority settings Supports up to 2 logical host arrays
Management and BIOS Configuration	Array creation and deletion Drive and array status reporting Rebuild initiation Initialize of drives (clears arrays and makes all drives Unassigned) Status Notification to Windows Event Log SMART monitoring of disk drives Enable/Disable of INT13 (addresses some compatibility

	issues) Enable/Disable of BIOS (addresses some compatibility issues)
Netcell Storage Manager application	Array creation and deletion Drive and array status reporting Rebuild initiation Array property setup FLASH BIOS update floppy disk creation and Firmware download utility Polling for drive or array errors, with poll setting Email notification Enable/Disable of INT13 (addresses some compatibility issues) Enable/Disable of BIOS (addresses some compatibility issues)
Environmental	Operating Temperature: 0oC to 50oC Storage Temperature: -5oC to 70oC
Power	Typical 5.5Watts

¹ Some previous generation SR3000 or SR5000 models will use the TD6405 Storage Processor.

Customer Support

For help with the installation of the Netcell Revolution storage processing card, contact Netcell's technical support or customer service at:

Telephone: 1-408-935-7700
 Fax: 1-408-935-7715
 Email: support@netcell.com
 Support : www.netcell.com/support.html
 General Information: www.netcell.com



LIMITED WARRANTY

NETCELL warrants that any storage processing card and its embedded firmware (collectively, the "Product") purchased new from NETCELL by a purchaser ("Purchaser") shall be free from material physical defects, for a period of two (2) years from the date of purchase (the "Warranty Period"). The terms governing the use of, and any warranty on, any software (except for the embedded firmware of the Product) provided by NETCELL are as provided with such software. Purchaser acknowledges and agrees that the terms set forth in this Warranty Statement shall set forth NETCELL's entire liability and obligations with respect to any actual or alleged breach of the foregoing warranty, and Purchaser's sole and exclusive remedy in relation thereto.

Notwithstanding the foregoing, NETCELL will not be obligated pursuant to this Warranty Statement in any way for problems with the Product arising as a result of any of the following: (a) abuse, misuse, accident or neglect by any person other than NETCELL; (b) repairs, alterations, and/or modifications performed by anyone other than NETCELL or its authorized agents; (c) use of the Product not in accordance with its documentation; (d) the combination or use of the Product with hardware or software not provided by NETCELL; and (l) any other cause beyond the reasonable control of NETCELL.

THE FOREGOING WARRANTY AND REMEDIES ARE EXCLUSIVE AND NETCELL HEREBY DISCLAIMS ALL OTHER WARRANTIES RELATING TO THE PRODUCT, EXPRESSED, IMPLIED OR OTHERWISE, INCLUDING WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT.

WARRANTY RETURN PROCEDURE

If NETCELL receives prompt notice from Purchaser in writing of defects in the Product during the Warranty Period, NETCELL shall, at its option, repair or replace the defective Product in accordance with the procedures set forth herein, or if repair or replacement of the defective Product is not commercially feasible within a reasonable amount of time, refund to Purchaser the amounts paid for the Product. Purchaser shall contact NETCELL's Customer Support Department at RMA@Netcell.com to receive a Return Merchandise Authorization ("RMA") Number. Any Product returned to NETCELL must be assigned a RMA Number and such RMA Number must be displayed prominently on the outside of the box that contains the returned Product. Any Product returned to NETCELL without a RMA Number will be refused and returned to Purchaser at Purchaser's expense. Once a RMA Number has been issued and the defective Product has been received by NETCELL, any repaired or replacement Product will be shipped to Purchaser at NETCELL's expense. All defective Products must be returned with insured ground service freight pre-paid, in packaging sufficient to protect the contents. All packaging, manuals and accessories must be returned with the shipment, unless otherwise specified in writing by a NETCELL customer support representative. Once NETCELL issues a RMA Number, Purchaser has fifteen (15) business days to return the defective Product. NETCELL reserves the right to refuse any shipment received after such fifteen (15) day period. Purchaser acknowledges and agrees that: (i) any replacement Product is only to be shipped upon receipt of original unit; and (ii) NETCELL reserves the right to fulfill the foregoing obligations with either new or refurbished parts.

LIMITATIONS OF LIABILITY

IN NO EVENT SHALL NETCELL BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ITS PERFORMANCE OR FAILURE TO PERFORM UNDER THIS WARRANTY STATEMENT, WHETHER DUE TO BREACH OF CONTRACT, BREACH OF WARRANTY, NEGLIGENCE, OR OTHERWISE, REGARDLESS OF WHETHER THE NETCELL WAS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES OR NOT OR ANY FAILURE OF ESSENTIAL PURPOSE OF ANY REMEDY HEREIN. NOTWITHSTANDING ANYTHING TO THE CONTRARY, NETCELL'S AGGREGATE LIABILITY TO PURCHASER UNDER THIS WARRANTY STATEMENT SHALL NOT EXCEED THE PURCHASE PRICE OF THE PRODUCT.

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