

UPS Integration with StorTrends® iTX



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Introduction

The need of businesses for rapid information retrieval continues to grow at a blistering pace. With tremendous increases in the processing and memory power, the gap between the CPU and I/O processing speeds has become the primary bottleneck in this process. In order to provide tolerable application performance, storage administrators typically enable read and write caching at various levels of the storage stack. However, enabling write caching comes with a catch; since data in the write-back cache is not persistent, an unanticipated power failure of the storage system will result in the loss of valuable data. To circumvent this problem, the administrator must employ an UPS (Uninterruptible Power Supply) to protect the system from abrupt power failures. It important to realize, however, that for systems in situations or locations where power failures are frequent and of extended duration, the presence of an UPS may still be not enough. In cases such as this, StorTrends® iTX data storage software provides the solution. StorTrends iTX software comes with several key features that many similar data storage packages lack, including intelligent support for UPS. This document explains in detail how UPS can be integrated with StorTrends iTX to enables robust protection of valuable user data.

StorTrends - UPS Integration

StorTrends iTX software supports both APC and Powerware UPS models as well as UPS with USB HID support¹. In order to fully benefit from the integrated UPS support included in StorTrends iTX, all the power connectors of UPS-controlled iTX nodes must be connected to the central UPS. In addition, one of the nodes must be connected to the UPS either through its serial COM or USB ports, depending on the type of UPS connected. This node must be then configured as the Master node using the UPS configuration page in ManageTrends®, the integrated web-based management utility found in StorTrends iTX.

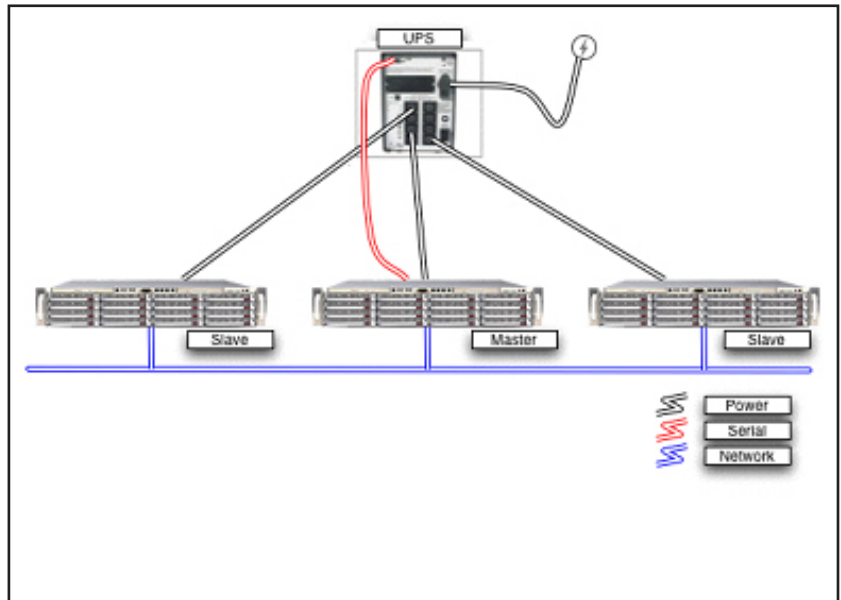


Figure 1: StorTrends Integrated UPS Configuration

UPS Configuration using ManageTrends®

In order to configure an array of nodes for UPS support, the administrator must connect to the ManageTrends interface of the Master node (as mentioned above), and access the UPS Configuration Page found in the ManageTrends Control Panel. The screenshots included at right show the Control Panel where the UPS Configuration page can be accessed (Figure 2), and the UPS Configuration Page for configuring the node as Master (Figure 3). In the UPS Configuration Page, the selected configuration modes must be set "Master/Single" for the Master node, and "Slave" for each of the slave nodes.

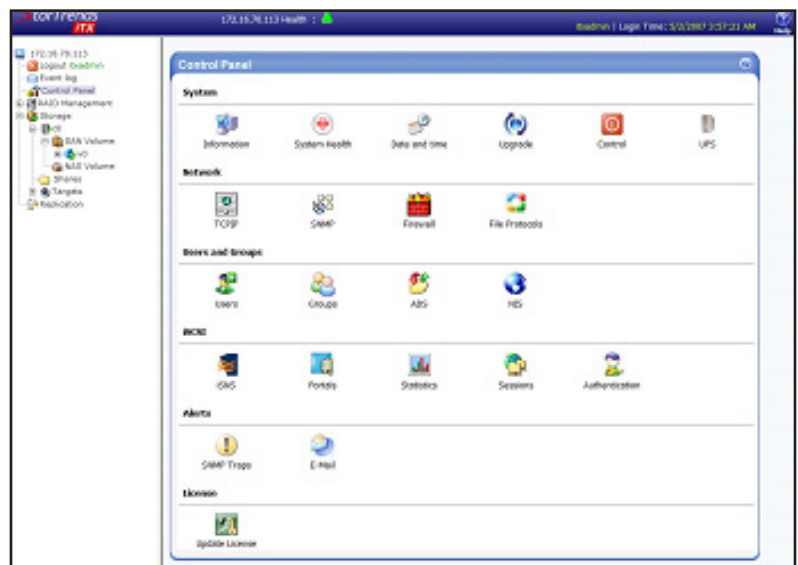


Figure 2: ManageTrends® Control Panel

¹ Contact your StorTrends Sales Representative for more information on supported models.

Further, for the Master Node the specific type of UPS connected must be selected, and the port through which it is connected must also be specified. The selected type of UPS supported could be any one of the approved APC Smart, Powerware or USB HID devices. Both APC Smart and Powerware UPS systems can be connected to either of the two COM ports available in a StorTrends storage appliance, and USB UPS systems can be connected to any of the USB ports available. The port to which the UPS is connected must also be selected in the UPS Configuration page in the Master node.

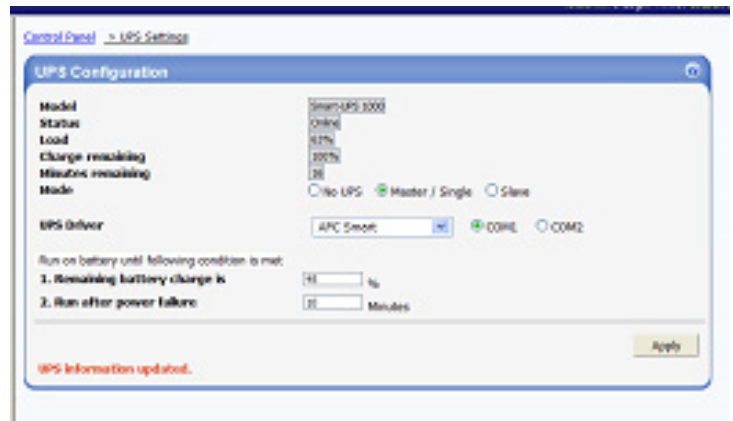


Figure 3: UPS Configuration Page

The Configuration Page in ManageTrends also has two fields that specify how long the StorTrends appliances can operate on UPS power, when the A/C power is cut. The first field specifies the amount of battery charge in UPS below which the StorTrends iTX nodes must initialize a graceful shutdown, and the other specifies the amount of time the StorTrends appliance will run on UPS power. If either one of these conditions is met, the StorTrends boxes executes a graceful shutdown, in order to prevent a potential data loss.

Any Slave nodes present must also be configured through the ManageTrends UPS Configuration Page, by specifying the mode as "Slave" and entering the Master IP address. A screenshot of slave node configuration is shown in Figure 4.

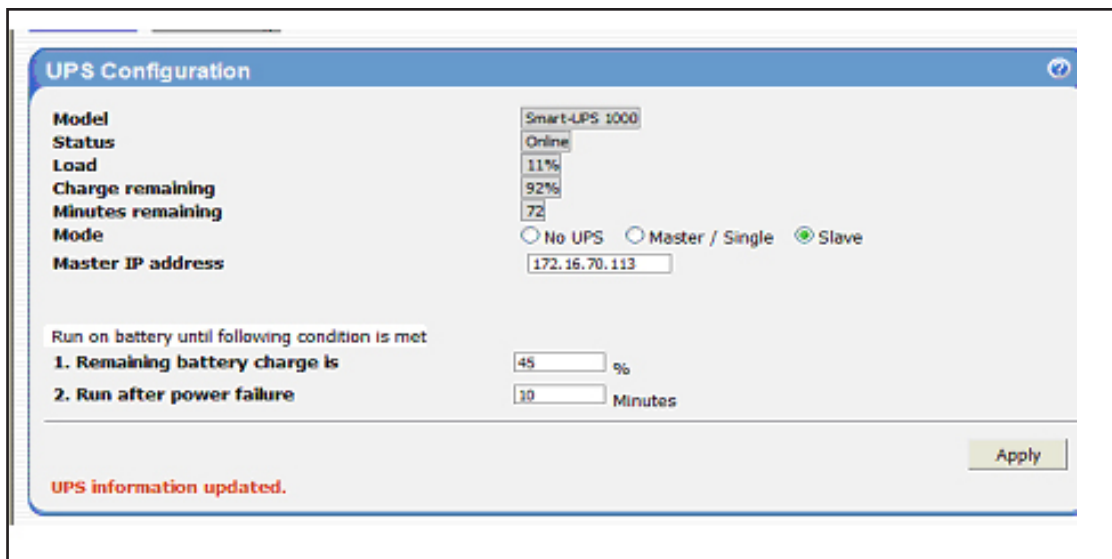


Figure 4: Configuring Slave Boxes

The status of the UPS can also be monitored using via the command-line interface (CLI). The following example in Figure 5 illustrates how to the CLI is used to identify the type of UPS connected, and monitor its status.

```

[root@ITX003048841e04 ~]# cli get -i ups
Model      Smart-UPS 1000
Status     AC Power
Load       63 %
Battery charge 100 %
Time left  016 min
Mode       Master/Single

Success.
[root@ITX003048841e04 ~]# cli get -i -m ups
Min Bat charge 45 %
Timeout       10 min
Mode          Master/Single
Graceful
shutdown enable YES

Success.

```

Figure 5: Monitoring a Connected UPS through the CLI

UPS Operation during Power Failure

In the event of a failure of A/C power, the UPS takes over and connected StorTrends appliances start running on UPS power. Depending on the type of UPS in use and the load on it, it will start discharging, and the amount of time and charge remaining in the UPS can be monitored using the ManageTrends. One key feature of StorTrends iTX UPS support emerges here, which is as soon as the UPS switches from the A/C power mode to UPS/battery mode, StorTrends iTX switches its Caching mode from Write-Back to Write-Through. **It is important to point out that in the case of StorTrends 1100 boxes (1U form factor), the disk caches are not in the control of the StorTrends device; therefore Caching will not be converted to write-through at this point.**²

The following screenshots display the cache modes before (Fig. 6) and after UPS (Fig. 7) takeover. In Figure 7 it can be clearly seen that after UPS takeover, Advanced Caching mode is disabled.

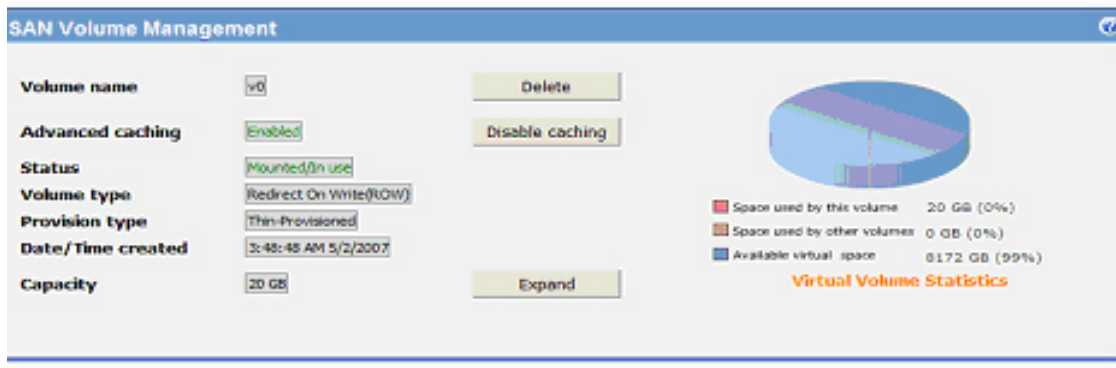


Figure 6: Cache Mode before UPS takeover

² Contact your StorTrends Sales Representative for more information on UPS support for 1U StorTrends 1100 models.

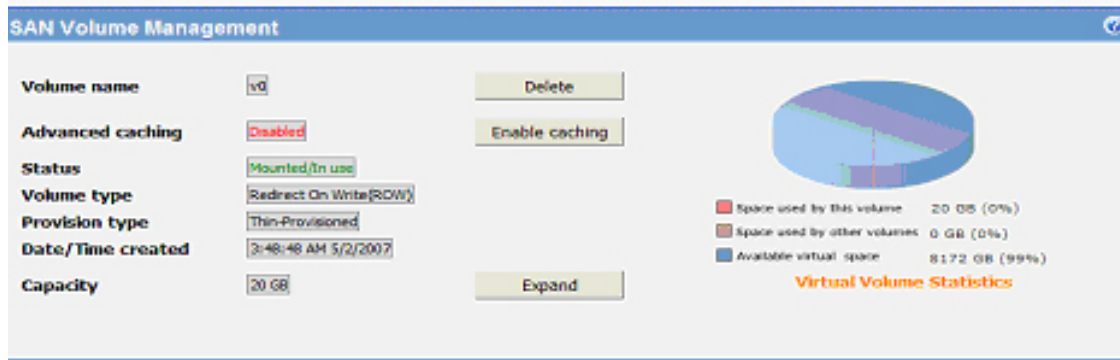


Figure 7: Cache Mode after UPS takeover

Figure 8 shows StorTrends iTX logging the change in the Cache mode in the system log.

```
set_cache_mode: Device index [0] name [/dev/mapper/c0_v0]

current mode [WB]
LOCAL ADDITION OF DEVICE TO CACHE
Device[/dev/mapper/c0_v0] added to cache
Device Index : 0
Cache Mode : Write Through
Reference Count : 1
```

Figure 8: Cache mode change documented in the StorTrends log

The ManageTrends event log is also updated with information regarding the loss of A/C power. The status of the UPS, regardless of whether the system is running on A/C or battery power, including the amount of charge and time remaining in the UPS can all be monitored using ManageTrends or the CLI. The following screenshots display both ManageTrends (Fig. 9) and CLI (Fig. 10) output when the UPS is providing power in battery mode.

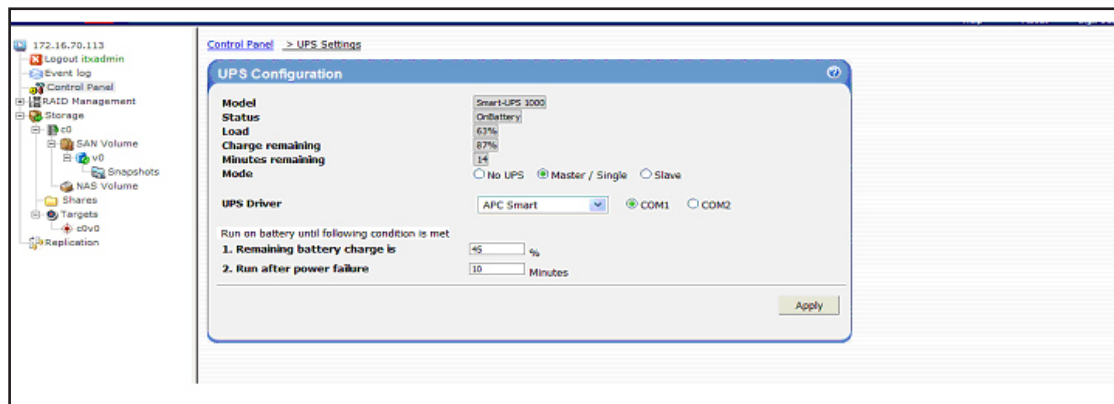


Figure 9: UPS in Battery Mode in ManageTrends

```

[root@ITX003048841e04 ~]# cli get -i ups
Model      Smart-UPS 1000
Status     Battery Power
Load       63 %
Battery charge 83 %
Time left  013 min
Mode       Master/Single

```

Figure 10: Monitoring UPS Status via the CLI

Once any one of the conditions specified for a graceful shutdown is reached in the UPS, StorTrends iTX will log this information (Figure 11), post an event to the ManageTrends event log (Figure 12) and trigger an automatic graceful shutdown of the connected appliance(s). This process ensures that all the data in the Write-Back caches are flushed to disk before shutting down, in order to guarantee the reliable performance of the appliances and safeguard against data loss.

```

May 2 04:16:57 ITX003048841e04 upsmon[9206]: UPS upsunit@127.0.0.1 battery is low
May 2 04:16:57 ITX003048841e04 upsmd[9202]: Client upsuser@127.0.0.1 set FSD on UPS [upsunit]
May 2 04:16:57 ITX003048841e04 upsmon[9206]: Executing automatic power-fail shutdown
May 2 04:16:57 ITX003048841e04 wall[10855]: wall: user root broadcasted 2 lines (43 chars)
May 2 04:16:57 ITX003048841e04 upsmon[9206]: Auto logout and shutdown proceeding
Broadcast message from root (Wed May 2 04:16:57 2007):

    Executing automatic power-fail shutdown

Broadcast message from root (Wed May 2 04:17:02 2007):

    The system is going down for system halt NOW!

```

Figure 11: Messages from StorTrends Log via CLI during Automatic Graceful Shutdown

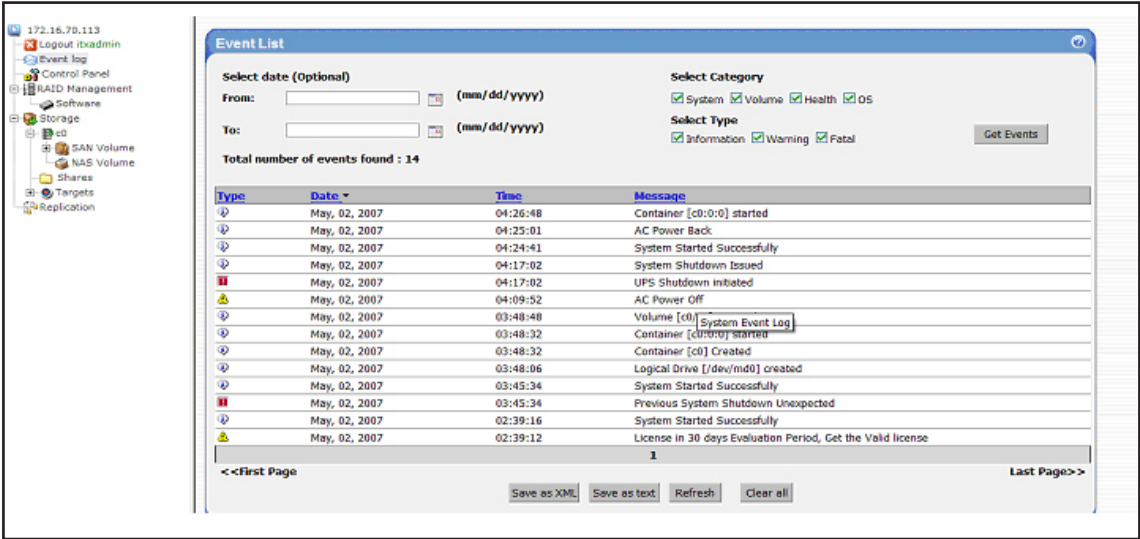


Figure 12: ManageTrends Event Log displaying Shutdown Information

Summary

StorTrends iTX features unique and intuitive features that set it apart from its contemporaries, once again leading the way with “enterprise-level features at an SMB price”. Thanks to robust integrated UPS support, StorTrends iTX ensures that no data is lost during a power failure and subsequent discharging of the UPS batteries. Features such as automatic conversion of the cache to write-through mode at the time of power

failure, and an automatic graceful shutdown at a preset time and battery reserve level mitigate the risk of sudden cessation of operation and disappearance of data. The parameters of the shutdown mechanism are all transparent and can be configured and modified by the Administrator, though both the integrated ManageTrends web-based management console, and through the command-line interface.

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