



esXpress 4.0
Backup Reports Reference Guide

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Documentation Updates

The following table contains updates made to this document. To verify that you are using the latest edition of a document, check the PHD Virtual website.

Chapter	Version	Description
1	4.0	Added information about WRN and WARN log messages.
1	4.0	Added log information for Change Block Tracking log messages.
1	4.0	"Messages" (on page 11): Added new section to describe additional report messages. 4/8/10

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Chapter 1 - esXpress Reports

esXpress generates daily backup status reports and emails them automatically to email addresses defined using the Management Appliance or PHD text menu on your host. Additionally, the Email tab in the Global Settings area of the Management Appliance or the text menu on the host can be used to configure some of the backup report options. Refer to the esXpress Management Appliance Guide or the Reference manual for details.

The remaining sections in this guide describe the esXpress backup reports in detail.

Backup Status Report

The daily backup status report contains information about all of the VMs backed up in the last backup window. The next few sections will examine a sample backup report for multiple VMs. The report would have been emailed with the subject line containing "All Good" because all backups completed without error. Other email subject lines could consist of "Warnings" or "Errors."

"Warnings" indicates that during the backup job, something occurred, but all VMs were backed up. This may happen if the target was rebooted during backups or some backups timed out and had to be retried. The reason for the warning can be found in the logs.

"Errors" indicates that at least one VM did not backup properly. There are many reasons for this, and a review of the logs is required in order to find the cause.

The first section of the daily backup report shows an overview of all VMs and their respective VMDK files that were backed up. The following image shows a sample of the first section of a daily backup report..

```
Status: All Good
Date : Fri Oct 2 22:40:19 EDT 2009
Host : phddemo4.esxpress.local
'200910-10-ENT-TMP'
esXpress v3.6, Copyright 2009, PHD Virtual Technologies Inc, www.esxpress.com
#####
# BACKUP STATUS REPORT, 'cat /etc/phd/esxpress.log' #
#####
2009-10-02 22:01:02o
2009-10-02 22:01:02o ----Started ONCE A DAY BACKUP
2009-10-02 22:03:19o skipped 'Demo4-FreeNAS' - '01-Demo4-FreeNAS_1.vmdk' - Skipped -
2009-10-02 22:09:04o PHDD 'Demo4_FreeNAS' - '00-Demo4-FreeNAS_2.vmdk' - 1/1 disks, (0.0%) 0m/1g
(4.3% Data), 32s, 32mb/s (112gb/hr) NET1 -b
2009-10-02 22:12:35o PHDD '2003' - '00-PHDTerm.vmdk' - 1/1 disks, (2.0%) 241m/12g (98% Data),
05:21s, 38mb/s (133gb/hr) NET1 -a
2009-10-02 22:12:47o OK 'Demo4-FreeNAS' - 1/1/1 disks, (0.0%) 0m/1g/1g (4.3% Data), 32s, 32mb/s
(112gb/hr), sent 0m VM 2/5 ON -b
2009-10-02 22:15:38o OK '2003' - 1/1/1 disks, (2.0%) 241m/12g/12g (98% Data), 05:21s, 38mb/s
(133gb/hr), sent 89m VM 1/5 ON -a
2009-10-02 22:21:54o PHDD 'Demo4_PFSense_200.229_' - '00-PFSense.vmdk' - 1/1 disks, (1.3%)
13m/1g (9.4% Data), 30s, 34mb/s (119gb/hr) NET1 -a
2009-10-02 22:25:20o OK 'Demo4-PFSense (200.229)' - 1/1/1 disks, (1.3%) 13m/1g/1g (9.4% Data),
30s, 34mb/s (119gb/hr), sent 2m VM 3/5 ON -a
2009-10-02 22:26:18o PHDD 'phd_dedup' - '00-phd-dedup.vmdk' - 1/1 disks, (1.8%) 338m/18g (19%
Data), 03:38s, 84mb/s (295gb/hr) NET1 -b
2009-10-02 22:29:25o OK 'phd-dedup' - 1/1/1 disks, (1.8%) 338m/18g/18g (19% Data), 03:38s,
84mb/s (295gb/hr), sent 45m VM 4/5 ON -b
2009-10-02 22:35:16o PHDD 'phd_gui' - '00-phd-gui.vmdk' - 1/1 disks, (4.7%) 383m/8g (43% Data),
02:22s, 57mb/s (200gb/hr) NET1 -a
2009-10-02 22:38:22o OK phd-gui' - 1/1/1 disks, (4.7%) 383m/8g/8g (43% Data), 02:22s, 57mb/s
(200gb/hr), sent 53m VM 5/5 ON -a
2009-10-02 22:38:57o
=====
2009-10-02 22:38:57o ALL TOTAL: 5 vms 5/5/5 disks, (2.4%) 975m/40g/40g (47% Data), Act: 37m:44s
18mb/s (63gb/hr) vs Vrt: 12m:23s 55mb/s (193gb/hr), sent 189m
2009-10-02 22:38:57o
2009-10-02 22:39:58o
2009-10-02 22:39:58o ALL Machine RETRY Backup Starting -----
-----
2009-10-02 22:39:58o
=====
2009-10-02 22:39:58o ALL TOTAL: RETRY BACKUPS COMPLETED
2009-10-02 22:39:58o
2009-10-02 22:40:10o ====Completed ONCE A DAY BACKUP - 09/10/02
```

Note the section **All Machine RETRY Backup Starting** - if there were any failed backups and auto retry was enabled then those backups would be shown in this section.

The top of the first section displays the overall status for the backup.

```
Status: All Good <-- Backups completed successfully
Date : Fri Oct 2 22:40:19 EDT 2009 <-- Time log was created (at the end of the backups)
Host : phddemo4.esxpress.local <-- The ESX host backups were run on
'200910-10-ENT-TMP' <-- License used
2009-10-02 22:01:02o ---Started ONCE A DAY BACKUP <--The Time backups began
2009-10-02 22:03:19o skipped 'Demo4-FreeNAS' - '01-Demo4-FreeNAS_1.vmdk' - Skipped <--This VMDK
was skipped intentionally
2009-10-02 22:09:04o PHDD 'Demo4_FreeNAS' - '00-Demo4-FreeNAS_2.vmdk' - 1/1 disks, (0.0%) 0m/1g
(4.3% Data), 32s, 32mb/s (112gb/hr) NET1 -b
```

The VM, Demo4-FreeNAS has two VMDKs, as shown in the example above. esXpress backs up all running VMs and all of the VMDKs associated those VMs unless specified not to.

The first VMDK for DEMO4-FreeNAS was skipped because of a skip file was used (there are many ways to skip the backup of a VM or VMDK, review the reference manual for more information). The second VMDK was not skipped and completed at 10:09pm (2009-10-02 22:09:04).

Now we'll take a closer look at the backup log for the completed VMDK for the 00-Demo4-FreeNAS_2.vmdk VM from the example above.

```
2009-10-02 22:09:04o PHDD 'Demo4_FreeNAS' - '00-Demo4-FreeNAS_2.vmdk' - 1/1 disks,
(0.0%) 0m/1g (4.3% Data), 32s, 32mb/s (112gb/hr) NET1 -b
```

The first section contains the date and time stamp of when the message was recorded.

```
2009-10-02 22:09:04o
```

The next section shows the backup type. In this example, PHDD indicates that this was a DeDupe backup. Other backup types can be FULL or DELTA.

```
PHDD
```

The name of the VM is next along with which VMDK was processed in this backup. If there is more than one VMDK, esXpress will label them starting with 00, then 01, 02, etc.

```
'Demo4_FreeNAS' - '00-Demo4-FreeNAS_2.vmdk'
```

This VMDK is number 1 of 1 disks attempted to be backed up, as seen in the next section. (0.0%) of the disk has changed since the last backup. This is the product of dividing the 0m (zero MBs) of changed data by the base disk which is 1g (One GB). The 1GB drive has 4.3% Data recorded to it, all of the other blocks of data are null.

```
1/1 disks, (0.0%) 0m/1g (4.3% Data)
```

The last part of the line shows that all backup data was read and processed in 32 seconds. This resulted in a backup speed of 32 Megabytes per second (1GB / 32sec) or 112 Gigabytes per hour. The -b indicates that this job was processed by VBA #2. If the backup had been done by VBA #1, -a would have been appended. Refer to "VBA Usage Chart" (on page 16) for more information about how multiple VBAs complete each backup.

```
32s, 32mb/s (112gb/hr) NET1 -b
```

The next line in the backup report contains additional information about the backup.

```
2009-10-02 22:12:47o OK 'Demo4-FreeNAS' - 1/1/1 disks, (0.0%) 0m/1g/1g (4.3%
Data), 32s, 32mb/s (112gb/hr), sent 0m VM 2/5 ON -b
```

At 2009-10-02 22:12:47, all VMDK backups for VM Demo4-FreeNAS had completed and snapshots were committed by VMware. 'OK' indicates the backup of this VM was successful and it is VM 2 of a total of 5 VMs on the host.

You will see the same pattern above repeated for each VM and associated VMDKs in the report. When all backups are completed, the ALL TOTAL line is displayed. For example:

```
2009-10-02 22:38:57o ALL TOTAL:5 vms 5/5/5 disks, (2.4%) 975m/40g/40g (47% Data),  
Act: 37m:44s 18mb/s (63gb/hr) vs Vrt: 12m:23s 55mb/s (193gb/hr), sent 189m
```

The ALL TOTAL line is the summary of all the backups. The details are similar to the individual VMDK backup log lines with additional information appended to the end.

```
5/5/5 disks
```

The second section shows the number of VMDK files in the backup. The three numbers show:

- Number of VMDKs backed up (5)
- Number of VMDKs attempted in the back up (5)
- Number of VMDKs found to be backed up (5)

In this example, all three sections show 5, which means all 5 VMDK files were backed up successfully. If the first number was less than the others that would indicate some of the VMDKs were not backed up.

```
(2.4%) 975m/40g/40g (47% Data)
```

This section shows the size of the VMDK files in the backup and how much data was actually part of the backup. The three numbers here show:

- Amount of data backed up from the VMDKs (975MB)
- Amount of data on the VMDKs attempted to be backed up (40GB)
- Amount of data on the VMDKs found to be backed up (40GB)

In this example, 40GB of total VMDK space existed of which 975MB was actually backed up. This represents the changed blocks for these backups, which is 2.4% of the total size (40GB). The last number (47% Data) shows that of the total VMDKs size of 40GB, 47% actually contained data—the remainder consisted of null blocks.

```
Act: 37m:44s 18mb/s (63gb/hr) vs Vrt: 12m:23s 55mb/s (193gb/hr)
```

Act is the total real time (actual) it took to run the backups. In this example, the backups took 37 minutes and 44 seconds with a backup overall speed of 18MB per second, or 63GB per hour.

Vrt shows the total overall time of all of the VBAs running, including all VBAs running in parallel. In this example, the VBAs processed data just over 12 minutes to complete at 55MB per second or 193GB per hour. The remaining time was used to create the VBAs and VMware snapshots.

```
sent 189m
```

Of the 40GB of data read, only 975MBs were unique. That data was then compressed to 189MB and sent to the backup target. The results in this example are due to the PHDD backup using deduplication and compression inside of the VBA.

Sorted Backup Status

The second part of the status report shows an alphabetical list of all VMs backed up along with the information from the first report. This makes it easier to see the events surrounding the VMDK backups of a single VM. The following example shows the first two VMs from a sample backup report.

```
#####
# SORTED BACKUP STATUS REPORT, 'cat /etc/phd/esxpress.log' #
#####
=====
== VM: 2003
=====
2009-10-02 22:12:35o PHDD '2003' - '00-PHDTerm.vmdk' - 1/1 disks, (2.0%) 241m/12g (98% Data),
05:21s, 38mb/s (133gb/hr) NET1 -a
2009-10-02 22:15:38o OK '2003' - 1/1/1 disks, (2.0%) 241m/12g/12g (98% Data), 05:21s, 38mb/s
(133gb/hr), sent 89m VM 1/5 ON -a
=====
== VM: Demo4-FreeNAS
=====
2009-10-02 22:03:19o skipped 'Demo4-FreeNAS' - '01-Demo4-FreeNAS_1.vmdk' - Skipped -
2009-10-02 22:09:04o PHDD 'Demo4_FreeNAS' - '00-Demo4-FreeNAS_2.vmdk' - 1/1 disks, (0.0%) 0m/1g
(4.3% Data), 32s, 32mb/s (112gb/hr) NET1 -b
2009-10-02 22:12:47o OK 'Demo4-FreeNAS' - 1/1/1 disks, (0.0%) 0m/1g/1g (4.3% Data), 32s, 32mb/s
(112gb/hr), sent 0m VM 2/5 ON -b
```

Errors and Warnings

The next section of the report contains any errors or warnings. Had there been warnings or errors in by nightly backup as indicated by a status of 'Errors' or 'Warnings,' a summary of all errors or warnings would appear next in the logs. The following is an example.

```
#####
# ERRORS IN THE ESXPRESS BACKUP LOG - '/var/log/esxpress.log' #
#####
2009-09-27 20:06:53.194a ERROR: 'Test server 08' - '00-Test server 08.vmdk' - Failed to Create
Helper VBA 2009-09-27 20:08:06.500b ERROR: 'esXpress_dedup' - '00-esXpress_dedup.vmdk' - Failed
to Create Helper VBA 2009-09-27 20:14:23.997a ERROR: 'esXpress' - '00-esXpress.vmdk' - Failed to
Create Helper VBA 2009-09-27 20:16:11.475b ERROR: 'sdc-dc1' - '01-sdc-dc1_1.vmdk' - Failed to
Create Helper VBA 2009-09-27 20:20:57.656a ERROR: 'sdc-dc1' - '00-sdc-dc1.vmdk' - Failed to
Create Helper VBA
#####
# WARNINGS IN THE ESXPRESS BACKUP LOG - '/var/log/esxpress.log' #
#####
2009-09-27 20:06:53.194a ERROR: 'Test server 08' - '00-Test server 08.vmdk' - Failed to Create
Helper VBA 2009-09-27 20:08:06.500b ERROR: 'esXpress_dedup' - '00-esXpress_dedup.vmdk' - Failed
to Create Helper VBA 2009-09-27 20:14:23.997a ERROR: 'esXpress' - '00-esXpress.vmdk' - Failed to
Create Helper VBA 2009-09-27 20:16:11.475b ERROR: 'sdc-dc1' - '01-sdc-dc1_1.vmdk' - Failed to
Create Helper VBA 2009-09-27 20:20:57.656a ERROR: 'sdc-dc1' - '00-sdc-dc1.vmdk' - Failed to
Create Helper VBA
```

Errors and warnings in the esXpress log are displayed using various status messages. Errors, as seen in the example above, are denoted with ERRORS after the log date and time.

There are two warning messages possible in the esXpress log, WRN and WARN.

WRN messages, as seen in the following example, display information about the backup process, only. These are not message that usually require any interaction or resolution.

```
2010-01-20 10:26:04.475 Current snapshot: 199 / "esXpress v3 Backups"
2010-01-20 10:26:04.479 WRN: VM "RH4-x64[x0]" has 'esXpress' snapshot
2010-01-20 10:26:04.591 Snap # 1, Base Level
2010-01-20 10:26:04.595 WRN - Tested VM "RH4-x64[x0]", snaps=1
```

WARN messages contain information that will require some interaction. For example, the following WARN message indicates the destination folder does not exist on the backup target, and therefore the backup could not be created.

```
2010-01-13 00:02:45.609R WARN: Folder '/vmfs/volumes/Storage1/backups' does not exist on SSH
Target #6
```

Messages

This section describes some of the messages contained within each backup report.

Last block on disk

esXpress processes backup data in 1 MB chunks. If the last block of a VMDK does not fall within a 1 MB boundary, a message similar to the following is added to the logs:

```
Last block on disk was <1MB (819KB). Continuing backup.
```

This is an informational message only and does not affect the backup processing.

Backup Log

The third part of the backup report contains the entire backup log (esxpress.log). The following example shows the first part of the log. You will see that this backup window began just after 7pm.

```
#####
# COMPLETE ESXPRESS BACKUP LOG FOR DAY - '/var/log/esxpress.log' #
#####
2009-10-09 19:01:02.190C -----
2009-10-09 19:01:02.192C Started ONCE A DAY BACKUP
2009-10-09 19:01:02.193C -----
2009-10-09 19:01:02.198C Backup Freq/Mode = DAILY/DELTA, Full=MONTHLY, running Index backup all
2009-10-09 19:01:08.4630
2009-10-09 19:01:08.4650
#####
2009-10-09 19:01:08.4660 PHD esXpress Backup ALL MACHINES Starting
```

The backup log is useful when troubleshooting issues with your backup process as it contains detailed information about each step esXpress takes to complete the backups of your virtual environment.

Let's explore the backup of a single VM that has one VMDK to see what occurs during a successful backup.

```
#####
# BACKUP LOG FOR VM: 'PHDTerm' #
#####
2010-01-02 11:32:50.880
2010-01-02 11:32:50.884 *****
2010-01-02 11:32:50.887 *****
2010-01-02 11:32:50.890 * Starting PHDD VBA Backup for: 2003 <- Name of the VM to be backed up
2010-01-02 11:32:50.893 *****
2010-01-02 11:32:50.896 *****
2010-01-02 11:32:50.902 Backup VM called for: '/Storage1/2003/PHDTerm.vmx' <- VMX file location
2010-01-02 11:32:50.911 esXpress Version: 4.0-1-internal-1 root@phddemo4.esxpress.local -
Intel(R) Core(TM)2 Quad CPU Q9300 @ 2.50GHz 7
2010-01-02 11:33:09.671 Testing snapshots on VM '2003'
```

Now we'll take a closer look at the details of each log line.

```
esXpress Version: 4.0-1-internal-1 root@phddemo4.esxpress.local - Intel(R)
Core(TM)2 Quad CPU Q9300 @ 2.50GHz 7
```

The line above contains the current version of esXpress (3.6-7), the ESX hostname (phddemo4) and the processor the ESX host runs on.

```
Testing snapshots on VM '2003'
```

Before esXpress begins backups, a test is run to make sure snapshots of the VM can be taken properly. This is a common point of failure—if the VMDK is a raw RDM or a VMDK in independent mode, snapshots cannot be taken and the backup will fail. If esXpress detects another snapshot and Snapshot on Snapshot is not enabled, backup of the VM will also fail. If esXpress detects its own snapshot was left hanging from a previous backup, esXpress will clean up old esXpress snapshots before starting the backup. Note that esXpress will also detect hanging snapshots from other backup products, but will not commit them nor will it continue with a backup if the snapshots were not left in a clean state.

```
2009-10-02 11:33:37.952
2009-10-02 11:33:37.955 Folder Name: /vmfs/volumes/Storage1/2003/PHDTerm.vmx - ON
2009-10-02 11:33:37.958 DisplayName: PHDTerm
2009-10-02 11:33:37.961 VMX UUID : 564d832e-8822-f12e-1b0c-39913c94db7f
2009-10-02 11:33:37.964 VMX GuestOS: winnetstandard
2009-10-02 11:33:37.966 VMX Version: 4
2009-10-02 11:33:37.969 ESX Version: VMware ESX 4.0.0 build-164009
2009-10-02 11:33:37.972 Annotation : _esXpress: 2009-10-01 22:14 - OK - 1/1/1 disks, (2.4%
290m/12g/12g (98% Data), 04:24s ON,:
2009-10-02 11:33:38.080 DISK 1 = scsi0:0.fileName = /Storage1/2003/PHDTerm.vmdk
2009-10-02 11:33:38.611 Helper License OK, Starting Helper for VM '2003'
```

Next, esXpress reads the VMX file for the VM. The state of the VM in this example is 'ON.' esXpress by default will not backup VMs that are powered off. Some key fields from the VMX file are recorded and then the esXpress license is checked. If the license is invalid or has expired, backups will not continue.

```
2009-10-02 11:34:21.830f Checking Free space for VBA on 'Storage1', 209.35 gb OK
2009-10-02 11:34:21.877f Checking Free space for VM '2003' on '/Storage1/2003', 209.35 gb OK
2009-10-02 11:34:26.206f Got VM lock, my PID 22932 for VM '2003'
```

Before creating a VBA, two important factors are checked. First the VMFS volume that esXpress will build a VBA on must have at least 3GB of free disk space. esXpress must have a VMFS volume for its VBAs—networked attached NFS will not work.

Second, free space is checked on the VMFS volume that the backup target is on. This is required for snapshots to grow during the backup process as users alter data on the VM that is backing up. If a snapshot should hit the end of the disk/LUN the volume will crash and all VMs on that volume will crash. By default, esXpress requires 3GB of free space on a volume to begin backups, it is recommended to change this to 10GB to start backups and 5GB to abort backups to avoid cleaning up snapshots that have reached the end of the disk.

```
2009-10-02 11:34:26.286f Checking for esXpress snapshots in Baja Mode
2009-10-02 11:34:41.767f Creating snapshot for: '2003'
2009-10-02 11:34:50.522f Create snapshot for: '2003' returned createsnapshot(esXpress v3
Backups, Backing up VMDK, started at: 2009-10-02 11:34:41 on phddemo4.esxpress.local, 0, 0) = 1:
0
2009-10-02 11:34:50.548f VBA 6, Snapshot added for: '2003'
2009-10-02 11:34:59.965f VBA 6, Backing up #1: /Storage1/2003/PHDTerm.vmdk
2009-10-02 11:34:59.969f VBA 6, Snapshot #1: /Storage1/2003/PHDTerm-000001.vmdk
2009-10-02 11:34:59.977f VBA 6, Backing up: 1 disks, for VM '2003'
2009-10-02 11:35:02.151f *****
2009-10-02 11:35:02.154f VBA 6, Starting backup of disk # 1/1: '/Storage1/2003/PHDTerm.vmdk'
2009-10-02 11:35:02.158f *****
```

If Snapshot on Snapshot is enabled, esXpress checks for existing snapshots (baja mode). The VM in this example does not have snapshots, so esXpress creates a snapshot called esXpress in vCenter. This can be seen above as PHDTerm-000001.vmdk. Now that the snapshot is taken, the backups begin. If you are using VSS, the VM is quiesce during the snapshot process.

```
2009-10-02 11:35:19.290f Building VBA Helper with buslogic --VBA is deployed from template
```

Chapter 1 - esXpress Reports

```
2009-10-02 11:36:26.523f Register VBA Helper 6: OK, '/vmfs/volumes/4a93b7f0-20637030-9b53-001e3752f454/esXpress_VBAs/esXpress_Helper.phddemo4.esxpress.local.6/esXpress.vmx' --VBA is registered with vCenter
2009-10-02 11:36:31.662f Creating package for VBA 6
2009-10-02 11:36:31.995f Taring up VBA 6: '/Storage1/2003'
2009-10-02 11:36:33.024f Issuing Power Up command for VBA 6 <--VBA instructed to power on
2009-10-02 11:36:55.772f Successful Start of VBA Helper 6 <--Startup confirmed
2009-10-02 11:36:58.887f Watching VBA Action Log <--VBA checked for successful boot
2009-10-02 11:37:23.219f VBA Date: Fri Oct 2 11:37:20 EDT 2009
2009-10-02 11:37:23.227f VBA Date: Fri Oct 2 11:36:00 EDT 2009 (set)
2009-10-02 11:37:23.235f Helper MAC address : 00:0C:29:32:EE:C5 <--VBA MAC address recorded
2009-10-02 11:37:23.243f Using DHCP esXpress Helper (waiting for IP) <--VBA looks for DHCP (or is given pre-assigned static IP)
2009-10-02 11:37:39.329f Helper IP: 10.1.4.144 <--IP address recorded
2009-10-02 11:37:41.303f After IP Check <--Network connection tested
```

In this section of the log, esXpress creates a VBA, registers it (with resource pool if a pool named esXpress exists), and then powers up and confirms it has an IP address and working network. If the VBA is set to DHCP and receives no IP address, backups will fail.

```
2009-10-02 11:37:45.329f Read Test 1 meg, OK
2009-10-02 11:37:45.337f Read Test 100 meg, OK, 50.0 mb/s at 2 seconds
2009-10-02 11:37:45.345f Creating PHDD backup for VMDK file, Size= 12288 MB.
```

Before backups begin, the VMDK that is to be backed up is tested. First, esXpress confirms that the VMDK can be read successfully. Next, 100MB of the VMDK are read and timed. This gives a preview as to how quickly the LUN/Disk being backed up can deliver data. In this example the disk can deliver data at 50MB/sec. Remember to note that backups cannot process faster than esXpress can read the data to be backed up. Disk read speed is a common bottleneck.

```
2009-10-02 11:37:45.353f Using Backup Target # 1 -----
2009-10-02 11:37:45.353f Mounting PHDD: 10.1.4.5 <-Attempts to connect to the Dedupe Appliance
2009-10-02 11:37:45.353f Mounted PHDD: 10.1.4.5 <-Connected successfully
2009-10-02 11:37:45.361f Mounting By-Pass NFS: 10.1.4.2:/mnt/backups <-VBA tries to connect directly to NFS share
2009-10-02 11:37:47.333f Mounted and using By-Pass NFS: 10.1.4.2:/mnt/backups <-NFS share direct (by-pass) connection successful
2009-10-02 11:37:51.360f Target #1, PHDD 10.1.4.5
2009-10-02 11:37:51.360f STARTING PHDD BACKUP
```

Next, esXpress needs a target for the backup data. In this example, De-duplicated data will be written to an NFS share. esXpress first communicates with the DeDupe Appliance and then attempts to send the data directly to target. If backups are PHDD to an NFS or SMB target, bypass is the most effective method of backup. If backups are PHDD to a VMFS target or bypass mode fails, the message 'using SSH' is shown. Full/Delta Backups will indicate a direct connection to the specified target. Should target connection fail, verify target type, IP address, and credentials are correct, otherwise backups will not continue.

```
2009-10-02 11:37:51.375f LIC: License Type: ENT-TMP Plug-ins Expire: 2009-10
-esXpress License and expiration
2009-10-02 11:37:51.383f Throttle Enabled: 20 mb/second, esXpress Throttle is enabled by time: 12 to 20
-Disk read Throttle speed if throttle is enabled
2009-10-02 11:37:59.430f CPU speed 50m: real 0m11.166s user 0m2.930s sys 0m8.220s
-CPU speed/load measurement
```

Before backups start passing data to the target, the license is rechecked. If Disk I/O throttling is enabled, the throttle speed for this VBA is then displayed. Next, the CPU is tested (CPU can be another system bottleneck). De-duplicated backups can require more CPU time to achieve higher levels of overall compression target side.

```
CPU real speeds of 0m12.000s or lower is considered fast.
CPU real speeds between 0m12.000s and 0m14.000s are acceptable
CPU real speeds above 0m14.000s indicate a slow or overloaded ESX Host
```

```

2009-10-02 11:38:01.412f ***** Starting DE-DUPE Process to PHDD 1 (bypass)
*****
2009-10-02 11:38:01.420f Data Mount = 291G 15G 253G 6% /data2
  -Backup Target is 291G, of which 15G is used and 253G is free (6% used)
2009-10-02 11:38:11.454f PHDD: 2%, 224 MB of 12288 MB at 22 (0) MB/Sec. Dur: 10s, 9M / 2M (2)
2009-10-02 11:38:21.604f PHDD: 7%, 827 MB of 12288 MB at 39 (54) MB/Sec. Dur: 21s, 14M / 3M (2)
2009-10-02 11:38:33.681f PHDD: 12%, 1501 MB of 12288 MB at 46 (61) MB/Sec. Dur: 32s, 14M / 3M
(2)
2009-10-02 11:38:43.715f PHDD: 18%, 2211 MB of 12288 MB at 51 (51) MB/Sec. Dur: 43s, 18M / 5M
(1)
2009-10-02 11:39:04.254f PHDD: 25%, 3033 MB of 12288 MB at 47 (46) MB/Sec. Dur: 01m:04s, 88M /
30M (2)
2009-10-02 11:39:25.840f PHDD: 32%, 3975 MB of 12288 MB at 47 (43) MB/Sec. Dur: 01m:24s, 149M /
47M (1)
2009-10-02 11:39:43.416f PHDD: 38%, 4610 MB of 12288 MB at 46 (41) MB/Sec. Dur: 01m:40s, 193M /
65M (2)
2009-10-02 11:40:01.524f PHDD: 44%, 5400 MB of 12288 MB at 44 (34) MB/Sec. Dur: 02m:01s, 253M /
89M (2)
2009-10-02 11:40:23.110f PHDD: 49%, 5990 MB of 12288 MB at 42 (33) MB/Sec. Dur: 02m:20s, 323M /
122M (1)
2009-10-02 11:40:39.921f PHDD: 56%, 6909 MB of 12288 MB at 44 (53) MB/Sec. Dur: 02m:37s, 356M /
138M (2)
2009-10-02 11:41:00.061f PHDD: 65%, 8033 MB of 12288 MB at 45 (49) MB/Sec. Dur: 02m:58s, 372M /
145M (1)
2009-10-02 11:41:17.640f PHDD: 71%, 8780 MB of 12288 MB at 45 (39) MB/Sec. Dur: 03m:15s, 385M /
151M (2)
2009-10-02 11:41:37.752f PHDD: 80%, 9891 MB of 12288 MB at 45 (50) MB/Sec. Dur: 03m:36s, 395M /
155M (2)
2009-10-02 11:42:00.770f PHDD: 89%, 10928 MB of 12288 MB at 45 (49) MB/Sec. Dur: 03m:58s, 399M /
157M (2)
2009-10-02 11:42:19.635f PHDD: 97%, 11973 MB of 12288 MB at 46 (46) MB/Sec. Dur: 04m:19s, 405M /
160M (2)
2009-10-02 11:42:27.690f PHDD: 100%, 12288 MB of 12288 MB at 46 MB/Sec. Dur: 04m:27s, 410M /
162M (0)
2009-10-02 11:42:27.698f Stats completed

```

The backup now begins sending data to the target.

```
PHDD: 89%, 10928 MB of 12288 M
```

The line above shows that the backup type is PHDD and it is 89% complete. 10,928MB out of 12,288MB of disk has been processed.

```
45 (49) MB/Sec. Dur: 03m:58s
```

The average backup speed is 45MB/sec, while the backup speed over the last 20 seconds was 49MB/sec. The backup has been running for 3 minutes and 58 seconds.

```
399M / 157M
```

Of the 10,928MB of data that has been processed only 399MB is unique. That 399MB has been compressed down to 157MB and sent to target. At the moment this line was recorded, this backup was getting a compression ratio of 69.5 to 1. The average for a Windows VM is 25:1.

(2)

The last number in parentheses displays the number of threads running. There are two threads running in this example.

```

2009-10-02 11:42:33.709f
2009-10-02 11:42:33.718f PHDD Blocks: 12288 Total, 410 Wrote, 11632 Skipped, 246 Zero for: 2003,
00-PHDTerm.vmdk
2009-10-02 11:42:33.728f PHDD Stats : 162 sent Meg (40%/1.32%) / 410 written meg (3.34%) / 12288
total meg for: 2003, 00-PHDTerm.vmdk

```

2009-10-02 11:42:33.736f Verified MD5 of 116 Blocks

The last section in this example can be interpreted as follows:

- This example backup job consisted of 12,288MB of data of which 410MB has changed since the last backup.
- 246MB of this disk is null data.
- The 410MB is a 3.34% change in data and was compressed to 162MB of data recorded on the NFS share.
- 162MB is a 40% compression of the 410MB of changed data and 1.32% total of the original 12,288MB of data.
- During this backup, 116 Blocks of data were verified (esXpress always verifies written data). Data that has not been verified at least once before will be verified by the VBAs during backups. This reduces the risks of bad blocks of data in an event of a restore.

Change Block Tracking Log Messages

When using Change Block Tracking (CBT), the esXpress logs will display some additional information. The first log indicator that CBT is being used is the following line:

```
Change block tracking is ENABLED on this host.
```

This lets you know that CBT has been enabled on the host (selected in the Management Appliance). Next, each VM is checked to determine if the VM supports CBT (hardware Version 7 and does not have any existing snapshots). If the VM did not support CBT, the following messages are displayed:

```
Change tracking is not supported by 'TestVM'  
Check VM is ver 7 and has no snapshots if this is the first CBT backup.
```

If CBT is supported, the following log message is recorded:

```
Change tracking is enabled for VM 'TestVM'
```

Next, a snapshot is created for the VM. At this time, a ChangeID is assigned to the current VM backup. The following log message indicates a sample ChangeID assigned to the first disk of a VM:

```
scsi0:0:2000 ChangeID = '52 37 6c 60 6a f2 cb d3-ec 1b 23 58 3d 2c 7d c9/241'
```

This ChangeID is used to find the previous CBT backup and to determine the blocks that have changed when the next CBT backup is taken.

After the snapshot is added, the backup begins. esXpress then requests the previous backup information from the storage device. In this sample log message, previous backups were stored on a DeDupe Appliance named Doc Dedup VMDK. If the backup information is available, it is downloaded and used to determine the number of changed blocks (dirty blocks) from the last backup.

```
Asking PHDD target Doc DeDup VMDK - 192.168.40.251 for previous backup information.  
Received backup information for 'TestVM.vmdk' from Doc DeDup VMDK  
Extracting previous PHDD Backup Index.  
Asking host for a list of dirty blocks for 'TestVM.vmdk' from ChangeID: '52 37 6c 60 6a f2 cb  
d3-ec 1b 23 58 3d 2c 7d c9/187'
```

If the previous CBT backup information was not available, the following messages are displayed:

```
Failed to download previous backup information from PHDD target.  
No Differential Change Block Tracking, will query host for dirty blocks.  
Asking host for a list of dirty blocks for 'TestVM.vmdk' from ChangeID: '*'
```

Since no previous information was available to compare the existing snapshot to, a complete backup (or “star” backup) is created. Star backups are created any time a regular CBT backup cannot be created. Refer to the esXpress CBT FAQ for more information about when CBT backups are available and supported.

In a regular CBT backup, where the CBT backup information is available, the messages would display the previous ChangeID:

```
Asking PHDD target Doc DeDupe VMDK - 192.168.40.122 for previous backup information.
Received backup information for 'TestVM.vmdk' from Doc DeDupe VMDK
Extracting previous PHDD Backup Index.
Asking host for a list of dirty blocks for 'TestVM.vmdk' from ChangeID: '52 bd fc 25 9c cb 00
7e-cf 45 48 a3 5a 57 f6 de/13'
```

Next, the number of changed blocks are displayed:

```
Got 9 dirty blocks in list from host.
Checking for BAD and UNVERIFIED blocks.
Changed block list successfully retrieved. Differential CBT backup will be run.
```

In this example, 9 blocks of data had changed since the last backup. The backup will then continue as normal; the VBA will start and the backup target is mounted.

The next CBT-related message displayed is the number of changed blocks, including the number of bad and unverified blocks, for example:

```
Dirty blocks = 9/9
```

This line contains two numbers. The first number (to the left of the slash) is the total number of changed, bad, and unverified blocks. The second number (to the right of the slash) is the total number of changed blocks, only. In this example, there were no bad or unverified blocks, so both numbers are the same.

When the backup is complete, a line displaying the CBT backup speed is recorded. For example:

```
Effective backup speed with Change Block Extraction was 20 MB/Sec.
```

Next the stats for the CBT backup are displayed.

```
PHDD Blocks: 350 Total, 9 Dirty, 0 Rechecked 9 Written, 0 Skipped, 0 Zero for: TestVM, 00-
TestVM.vmdk
PHDD Stats : 1 Sent MB (11%/11.11%) / 9 Written MB (100.00%) / 1 Copied MB / 9 Total MB for:
TestVM, 00-TestVM.vmdk
```

Finally, the summary line for the backup is recorded:

```
OK PHDD 'TestVM' - '00-TestVM.vmdk' - 1/1 disks, (2.6%) 9m/0.3g (98% Data), Effective CBT backup
speed 20MB/s, Overall backup time 01:30s, 3MB/s (10gb/hr) NET1
```

VBA Usage Chart

The VBA Usage Chart is the fourth section of the Backup Status report and shows which VBAs were used to create each backup. In the example below, two VBA helpers were used (A and B).

```
#####
# VBA USAGE CHART FOR DAY, COMPUTED FROM '/var/log/esxpress.log' #
#####
VBA Runtime for 'test.esxpress.local'
2008-10-09 19:01 PHD esXpress Backup ALL MACHINES Starting
2008-10-09 19:01
2008-10-09 19:02 A
2008-10-09 19:03 A B
```

Chapter 1 - esXpress Reports

```
2008-10-09 19:04 A B
2008-10-09 19:05 A
2008-10-09 19:06 A B
2008-10-09 19:07 A B
2008-10-09 19:08 A B
2008-10-09 19:09 A B
2008-10-09 19:10 A B
2008-10-09 19:11 A B
2008-10-09 19:12 A B
2008-10-09 19:13 A B
2008-10-09 19:14 B
2008-10-09 19:15 a B
2008-10-09 19:16 a B
2008-10-09 19:18 a
2008-10-09 19:19 a b
2008-10-09 19:20 a b
2008-10-09 19:21 a b
```

When a helper indicator letter changes from a capital to lowercase or vice versa, this indicates that the helper is now backing up a new VMDK. In the figure above Helper A ends its backup at 19:13 (note the capital letter A) and then starts a new VMDK backup at 19:15 (note the lowercase letter a).

Backup Target Report

The Backup Target Report contains a number of sections that show the target data in a variety of formats and sort ordering. Formats and sorting in the report include:

- By each target, sorted by Alphabetical
- By each Date, sorted by Date Descending
- Delta Backups without a matching Full
- VMFS snapshot report for VMFS folders
- By VM/VMDK, sorted by Alphabetical
- By Virtual Machine, sorted by Alphabetical
- By VMDK, sorted by Alphabetical
- By Target, sorted by Last Backup Date Descending
- By Virtual, Machine sorted by Last Backup Date Descending
- By VMDK, sorted by Last Backup Date Descending
- By Virtual, Machine sorted by Total Size Descending
- By VMDK, sorted by Total Size Descending

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