# Optimizing Backup Exec 2014 Performance

## Hands-On Lab

### Description
This hands-on lab will demonstrate important tips and tricks for optimizing the performance of the upcoming Backup Exec 2014 product.

### At the end of this lab, you must be able to:
- Understand client and backup server configuration attributes for a deduplication storage device.
- Understand how to tune the backups for VMware.
- Understand the potential backup performance implications of not having a dedicated backup network.
- Understand how to tune tape devices for optimal backup and restore performance.
- Understand how to improve tape out (duplicate sets to tape) performance from a deduplication storage device.

### Notes
- A brief presentation will introduce this lab session and discuss key concepts.
- The lab will be directed and provide you with step-by-step walkthroughs of key features.
- Feel free to follow the lab using the instructions on the following pages. You can optionally perform this lab at your own pace.
- Be sure to ask your instructor any questions you may have.
- Thank you for coming to our lab session.
Exercise 1: Review the Lab Environment

The following diagram outlines the configuration of the Backup Exec hands-on lab environment. For this lab, we will only be using the following virtual machines:

- DC
- BE2014
- VTL
Exercise 2: Deduplication Storage Device Configuration

Step 1: Prepare the server

- Open the console on the BE2014 virtual machine.
- If necessary, log onto the virtual machine (password is P@ssw0rd).
- Double-click the Backup Exec 2014 icon on the desktop to launch Backup Exec 2014.
- Click the Backup Exec button. From the drop-down menu, click Configuration and Settings and Backup Exec Settings.

  The Settings window is displayed.

  On the left pane, click Storage. Scroll down, review the warning and uncheck the Allow Backup Exec to delete all expired backup sets option. Then click OK.
• On the Backup Exec 2014 UI, click the **Backup and Restore** tab.

• Select **Add**.

• The **Add a Server** dialog box is displayed.

• Select **Microsoft Windows computer and servers** (default) and click **Next**.

• Mark the **Allow Backup Exec to establish a trust with the servers** check box and click **Next**.

• Type the name of the server as **DC** and click **Add**.

• Click **Next**.

• Mark the **Upgrade the Backup Exec Agent...** and **Restart the remote computer...** check boxes and click **Next**.

• On the **Summary** screen, click **Next**.
• When the agent deployment process has completed, click Finish.

• On the Backup and Restore tab of the Backup Exec 2014 interface, select the DC server and while this server is highlighted click on Backup.

• Select Backup to Deduplication Disk Storage.

• On the left of the Backup Definition Properties screen, click Edit.
• Select C:\ for backup, and then click OK.

• Click OK.
On the Backup Definition Properties screen, click Edit on the right side, under Backup.

Click Schedule.

Select the Create without a schedule radio button.

Close the Incremental job template window.

In the Backup Options window, in the left pane, click Verify.
• Select the **Do not verify data for this job** option. Read the Symantec recommendation that appears.

• Click **OK** twice.

• Notice the status in the bottom left corner

• Double click the icon on the far right hand side on this notification bar to open the **Backup Exec Services Manager**.

![Backup Exec Services Manager](image)

• Select **Restart all services**.

• When all the services are in **Running** state, click **Close**.

• In the Backup Exec UI, double-click the **DC** server object in the **Backup and Restore** view.

• In the left pane, click **Direct access properties** and verify that that the **State** is **online**.

• In the left pane, click **Direct access sharing** and verify the **This device has been shared with the media server** status is displayed.
Step 4: Deduplication storage device data stream settings

- Click the **Storage** tab.

- In the left pane, click **Properties**.

- Click the **Data stream size** drop down. Note the different stream sizes.

<table>
<thead>
<tr>
<th>Data stream size</th>
<th>Deduplication ratio</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>Better (more efficient)</td>
<td>Less</td>
</tr>
<tr>
<td>Large</td>
<td>Less (less efficient)</td>
<td>Better</td>
</tr>
</tbody>
</table>
Step 5: Viewing where to set the tuning parameters for VMware backups

- Minimize the Backup Exec window.
- Click the **Windows** icon located at the bottom left of the screen.
- Click the **Window Powershell** icon.
- Type `regedit` and press **Enter**.
- **Go to** `HKEY_LOCAL_MACHINE\SOFTWARE\Symantec\Backup Exec For Windows\Backup Exec\Engine\VMware Agent`
  
  "Enable Buffered Reads"=dword:00000001
  "Enable Buffered Writes"=dword:00000001
  "Number of Read Buffers"=dword:00000004
  "Number of Write Buffers"=dword:00000004
  "Size of Read Buffers"=dword:00000400
  "Size of Write Buffers"=dword:00000400
  "Write Thread Priority"=dword:00000000
  "Read Thread Priority"=dword:00000000

- The buffered Reads and Writes are enabled by default. The tuneable setting for backups are the Write buffer size and Number of buffers. The settings that gives the best performance may vary from environment to environment.
- **Close regedit.**
Exercise 3: Performance Advantages from a Dedicated Backup Network

Step 1: Create Backup Using Non-dedicated Backup Network

- Return to the BE2014 virtual machine.
- Open Network Connections.
- Enable the Production Network device.

- Return to the Backup Exec 2014 console.
- Select the Backup and Restore tab.
- In the Server list, select the DC server.
- In the backups group, click One-Time Backup and then One-Time Backup to Disk.

- The Backup Definition Properties screen is displayed.
- On the left of the Backup Definition Properties screen, under DC, click Edit.
Select the E:\ for backup, and then click OK.

On the right of the Backup Definition Properties screen, under One-Time Backup, click Edit.

In the left pane, select Network.

In the right pane, select the drop-down menu for Network interface and select Production Network.

Click OK.

Click OK.

Select the Job Monitor tab.

Monitor the progress of the one-time backup job and make a note of the time elapsed, once the job has completed.
Step 2: Create Backup Using Dedicated Backup Network

- Select the one-time backup job run previously in **Step 1** (lower pane of the **Job Monitor**).
- Right-click the job and select **Edit Backup**.

![Backup Definition Properties](image)

- On the right of the **Backup Definition Properties** screen, select **Edit**.
- On the left pane, select **Network**.

![Network Options](image)

- In the right pane, select the drop-down menu for **Network interface** and select **Backup Network**.
- Click **OK**.
- Click **OK**.
- Select the **Job Monitor** tab.
- Monitor the progress of the one-time backup job and make note of the time elapsed once the job has completed.
- Compare the time elapsed against the original run of the job in **Step 1**.
- Open **Network Connections**.
- Disable the **Production Network** device.

Close the network connection window.
Exercise 4: Tape Device Performance Tuning

Step 1: Tune VTL Device

- On the Backup Exc 2014 interface, select the Storage tab.
- In the storage device list, under Robotic library 001, select Tape drive 001.
- In the top right corner, select Tape drive 001 details.

- Find the available options for Block size, Buffer size, Buffer count, and High water count.

- Spend a few moments experimenting with the options and values in these fields.

Larger block sizes may improve the backup and restore performance. Make sure that the block size and the buffer size are set properly. The throughput may increase in proportion with the increased block size until the drive’s maximum throughput is reached. The throughput will with changed block sizes will depend on the type of data being backed up.

Most current tape devices must achieve better performance when larger block sizes are used. If you use a device that supports larger block sizes, you can change the device’s block size in the Device Properties dialog box.

You can edit the following tape drive properties to improve the backup and restore process:

- Hardware compression, if the drive supports compression
- Preferred block size, buffer size, buffer count, and high water count
- Read and write settings for single block mode
Read and write settings for SCSI pass-through mode and block modes

This setting will enable the bypass of the OS's tape API's and will usually give a performance gain. Local disk drives on the Backup Exec server can usually be backed up at a higher rate of speed than backing up remote computers across a network.

Read Single Block Mode

If this is checked, the device reads a single block of data at a time, regardless of the size of the buffer block.

It is recommended to enable these settings if the tape device is shared between media servers (CASO).

Write Single Block Mode

This can provide greater control over the handling of data write errors.

It is recommended to enable these settings if the device is shared between media servers (CASO).

Read SCSI Pass-Through Mode and Write SCSI Pass Through Mode

Enabling these settings allows data to pass directly through the device driver and allows more detailed information if device errors occur.

It is recommended to enable these settings if the device is shared between media servers (CASO).

Block and buffer settings

Block size

- Block size can be increased to be greater than 64KB for big block capable devices.
- After a block size change, the first job to a tape needs to be an overwrite job.
- Symantec recommends verifying the backup after the block size has been changed.
- Ensure that jobs are in the overwrite mode only and not in the append mode after a block size change.

Buffer Size

- Defines the amount of data to be sent to the device for read or write requests.
- The buffer size must be an even multiple of the block size.

Buffer Count

- Defines the number of buffers allocated for the device.
- Depending on available system memory, increasing buffer count value may improve device performance.
- High water count can be left at 0 as the device driver will control this as needed.
• Go to Job Monitor and edit the job created in Exercise 1.
• Change the Storage device to Tape drive 0001. Click OK twice.
• Right-click the job and click Run now.
• When the job completes, go to the Storage tab and double-click Tape Drive 0001.
• Change the Block Size and Buffer Size to 256 and click OK.
• Again, right-click the job and click Run now.
• When the job completes, go to the Storage tab and double-click Tape Drive 0001.
• Change the Block Size and Buffer Size to 32 and click OK.
• Again, right-click the job and click Run now.
• When the job completes, go to Job History and compare the performance of the three jobs.
• Minimize the Backup Exec window.
Exercise 5: Rehydration Performance Tuning

Step 1: Open the Deduplication Storage device configuration file

- Open File Explorer
- Open with wordpad \Program Files\Symantec\Backup Exec\contentrouter.cfg. Do find for “PrefetchThreadNum” and change the value from the default “1” to “2”. Only do these changes in increments of one and do tests with each setting change. **Note:** It is good practice to keep a copy of this file before doing any edits!

```
EnableContainerTruncate=true
; the number of threads for segment prefetching
; The default value is 1.
; @restart
; @validate [0-9]+
PrefetchThreadNum=2
; average data size threshold per container for a given backup image to be
; considered for rebasing. High value triggers more rebasing operation
; @restart
RebaseScatterThreshold=64MB
; Rebasing quota per day (how much data can be relocated each day)
; @restart
```

- Open with wordpad \Program Files\Symantec\Backup Exec\contentrouter.cfg. Do find for “ReadBufferSize” and change the value from the default “65536” to “1048576”. The values are listed in bytes. Never increase this above above 1MB (1048576)!

```
; Filesystem read buffer size, in bytes
; Running tasks will continue with the original value.
; @reload
; @validate [0-9]+
ReadBufferSize=1048576
; Filesystem write buffer size, in bytes
; @random
WriteBufferSizes=32768
; The maximum size of a DO record. This limits the number of segments to
; approximately MaxDOSize/16
; @random
```

- For the configuration file changes to take effect, the Backup Exec services must be restarted, including the Deduplication storage device services.
- Open the **Backup Exec Services Manager**.
- Close the **Backup Exec Services Manager**.