

# **BrightStor® ARCserve® Backup for Windows**

## **Tape RAID Option Guide r11.5**



Computer Associates®

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# Chapter 1: Introducing the Option

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BrightStor® ARCserve® Backup is a comprehensive storage solution for applications, databases, distributed servers, and file systems. It provides backup and restore capabilities for databases, business-critical applications, and network clients. BrightStor ARCserve Backup also helps administrators simplify running all backup and restore jobs by using parallel streaming and advanced device management.

Among the options BrightStor ARCserve Backup offers is the BrightStor® ARCserve® Backup Tape RAID Option. The BrightStor ARCserve Backup Tape RAID Option adds tape RAID capability to BrightStor ARCserve Backup. All the standard backup and restore functionality of BrightStor ARCserve Backup applies to the RAID devices you create using the option.

This option lets you implement a redundant array of independent devices (RAID) technology in your BrightStor ARCserve Backup environment, using multiple drives to simultaneously process data during backup and restore operations. It writes data across all the drives in the array, in a predefined order. Each drive array appears on all informational screens as a single virtual drive. The option supports RAID levels 0, 1, and 5.

## Option Benefits

BrightStor ARCserve Backup Tape RAID Option offers significant performance benefits to your backup system by providing fault tolerance. During a restore, if one of the media becomes unusable, you can still restore data from the remaining media.

This option combines a number of disk drives to give better cost, performance, capacity, and reliability than you can achieve with a single disk. It also provides data redundancy, improved performance, and quick data recoverability from disk crashes.

The following summarizes the benefits of each RAID level:

- RAID 0 is an ideal solution when you require optimum performance. The other two levels provide fault tolerance.
- RAID 1 offers a reasonably good fault tolerance and performance.
- RAID 5 increases the virtual capacity of your media as three drives appear as one virtual drive. This results in excellent performance and good fault tolerance.

## RAID Overview

RAID is a performance enhancing method of spreading or duplicating data across multiple disk drives. It is a method of using several hard disk drives in an array to provide fault-tolerance in the event that one or more drives fail. Because multiple disks increase the mean time between failure (MTBF), storing data redundantly increases fault-tolerance and achieves faster data throughput.

The BrightStor ARCserve Backup Tape RAID Option provides a set of drives that act as a single, high-performance drive. With this option you perform operations the same way you perform regular BrightStor ARCserve Backup operations, except that you are working with a RAID media set instead of a single media drive.

A RAID set is a set of drives that share the same RAID level and act as a single, high-performance drive. When configuring a backup job with the option, you select the RAID group as your destination; this group contains all the drives configured in that RAID set.

RAID configurations typically require small computer system interface (SCSI) disk drives and may require identical drives.

**Note:** The BrightStor® ARCserve® Backup Serverless Backup Option cannot be used with the BrightStor ARCserve Backup Tape RAID Option.

System and installation requirements for the BrightStor ARCserve Backup Tape RAID Option can be found in the readme file for this release.

## RAID Levels

The BrightStor ARCserve Backup Tape RAID Option offers three types of fault tolerance modes: RAID levels 0, 1, and 5. The different levels are each designed for a specific use:

- RAID 0—Data Striping
- RAID 1—Disk Mirroring
- RAID 5—Striping with Distributed Parity at byte level and Stripe Error Correction Information

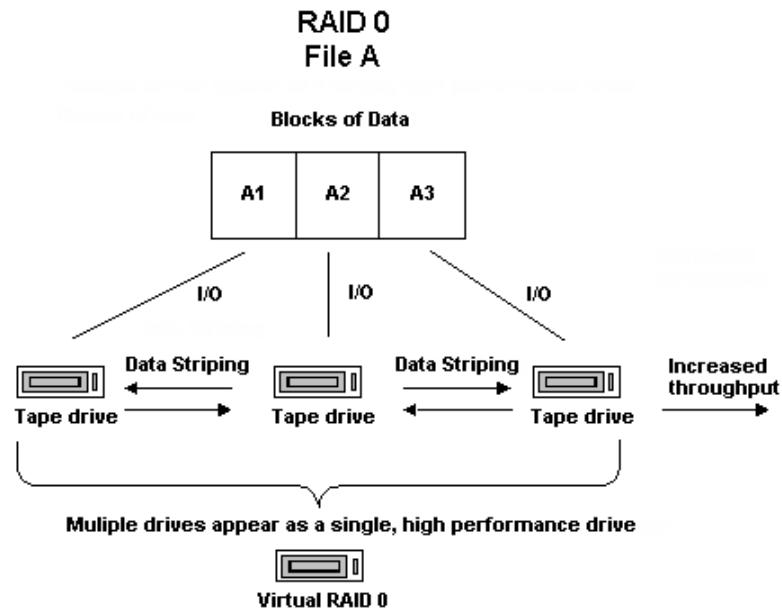
**Note:** The RAID level for your installation depends on how you use your network.

## RAID 0: Data Striping

Data striping transparently distributes data over multiple drives to make them appear as a single, high-performance drive. This involves spreading out blocks of each file across multiple disks. Data striping uses parallel data processing to provide high throughput performance.

Although data striping provides high performance by allowing data to be processed in parallel, it does not provide fault tolerance. If a single drive in a RAID level 0 array fails, all data is lost; in the case of RAID tape drives, the backup is not available because of the drive failure.

RAID level 0 is an ideal solution when you require optimum throughput and fault tolerance is not an issue. If fault tolerance is required, you must use RAID level 1 or RAID level 5. The following diagram shows how data is distributed in a RAID 0 configuration:



**Note:** Optimum performance is limited by the speed of the slowest drive in the array.

## RAID 1: Mirroring

Mirroring is the most widely implemented level of RAID. It allows you to maintain two copies of backup data; one is typically maintained at the backup location and the other is located safely off site. It combines two physical disks into a single array. Data is written to or read from both drives at the same time. RAID 1 provides fault tolerance and reliability, by allowing you to maintain two copies of backup data: one that is typically maintained at the backup location and the duplicate or mirrored copy located safely at another site. You can use this RAID level to transport your data easily without performing a media copy operation.

In the mirroring mode, the operations of the drives are duplicated. Whenever data is written to one drive, the same data is also written to the redundant drive, so there are always two copies of the data. The redundant drive ensures that the backup is completed, even if a drive or media fails. In case of drive failure, the backup or restore continues with the remaining drive.

**Note:** RAID 1 is also referred to as disk mirroring or duplexing. Mirroring uses one channel and duplexing uses two channels.

In non-RAID mode functions, the media sets used in mirroring are compatible with BrightStor ARCserve Backup. You can use BrightStor ARCserve Backup in this mode to restore data from either of the RAID drives, but a session appended in non-RAID mode makes the media unusable in RAID mode. If the media needs to be used again, it must first be erased or reformatted.

## RAID 5: Parity

Parity is an error-detection method used to detect and correct errors in data transmissions by performing specific checks of the data blocks within a stripe. In the event of a single drive failure, the information for the missing drive or media can be recreated by examining the remaining data and the parity information. This information enables the system to regenerate the missing data bits.

RAID 5 incorporates data striping. With a RAID 5 array using three or more drives, data and parity are striped across all the drives. Data is processed on two drives while the third drive holds the parity information. If one of the data drives is lost, the parity information ensures that the missing data can be recreated.

RAID 5 combines good performance, fault tolerance, high capacity, and storage efficiency. Because of the need for the system to calculate parity information during write activity, RAID 5 is best suited to situations where read activity is much higher than write activity. (For situations where write activity is high, RAID 1 is probably a better choice).

RAID 5 increases the virtual capacity of your media since three drives appear as one virtual drive. For example, if your media's capacity were two GB, normally you would need two spanning tapes to back up four GB. However, with RAID 5, you can store the same four GB on one virtual media without spanning. If you are using three drives with RAID 5, your storage capacity doubles. If you are using five drives with RAID 5, your perceived storage capacity quadruples.



# Chapter 2: Installing the Option

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This chapter provides the information you need to install and configure the BrightStor ARCserve Backup Tape RAID Option. The information in this chapter assumes you are familiar with the characteristics and requirements of the specified Windows operating systems in general, and with administrator responsibilities on those operating systems in particular.

## Installation Prerequisites

Before you install the BrightStor ARCserve Backup Tape RAID Option, verify that the following applications are installed and working properly:

- BrightStor ARCserve Backup
- For a tape library configuration, the BrightStor® ARCserve® Tape Library Option

**Important!** *You must install the BrightStor ARCserve Backup Tape RAID Option and BrightStor ARCserve Backup on the same machine.*

Before you begin to install the BrightStor ARCserve Backup Tape RAID Option, you must have the following:

- Administrator privileges or the proper authority to install software on the machines where you will be installing the product or its components.  
**Note:** Contact your administrator to obtain the proper rights if you do not have them.
- Your system meets the software requirements needed to install the option. For a list of requirements, see the readme file.
- The name and password of the machine you are installing the option on.
- For a primary server configuration, determine the RAID levels that you want to configure.

You can configure RAID devices during or after the installation. The Tape Engine must be shut down when you configure RAID devices. For information on configuring RAID devices, see the chapter, "Using the Option." If you are configuring a distributed server, you can skip the configuration of RAID devices because the primary server provides the information.

## Install the Option

The BrightStor ARCserve Backup Tape RAID Option follows the standard installation procedure for the system components, agents, and options of BrightStor ARCserve Backup. For the detailed steps in this procedure, see the *Getting Started*.

After you complete the installation procedure, be sure to restart your computer when prompted.

## Uninstall the Option

Uninstalling the option make it no longer available for use. To uninstall the BrightStor ARCserve Backup Tape RAID Option, follow these steps:

1. Open the Windows Control Panel.
2. Double-click the Add or Remove Programs icon.
3. Select the agent or option.
4. Click Remove.

The Add or Remove Programs dialog opens and asks if you want to remove the agent or option.

5. Click Yes.

**Note:** Wait for any backup jobs to finish before:

- Stopping the option
- Stopping and then uninstalling the option

Jobs, which started before you stop the option, will finish.

# Chapter 3: Using the Option

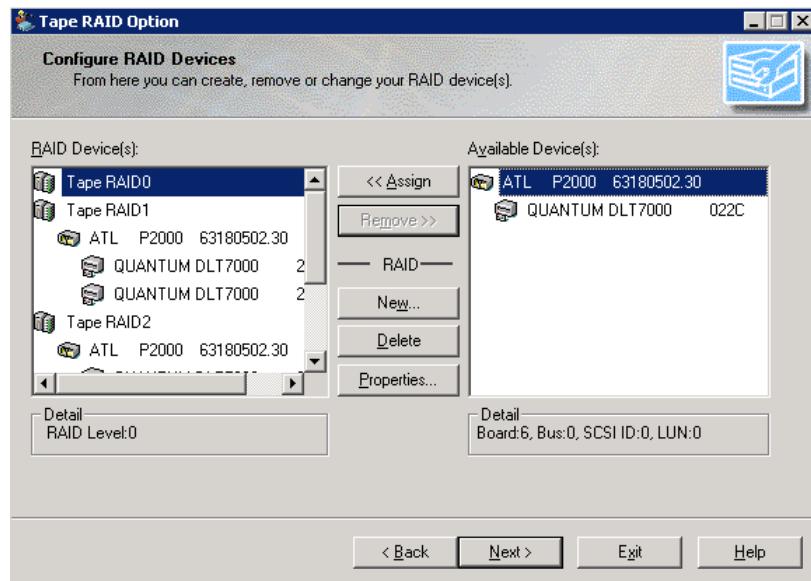
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This chapter provides information on managing and configuring RAID devices after you have installed the BrightStor ARCserve Backup Tape RAID Option.

## Configure RAID Devices

To configure RAID devices, follow these steps:

1. Access the following Configure RAID Devices dialog of the BrightStor ARCserve Backup Device Configuration feature:



2. Perform any of the following actions from the Configure RAID Devices dialog:
  - Create a new RAID device.
  - Delete an existing RAID device.
  - Change properties, such as RAID level.
  - Assign a device to an existing RAID device.
  - Remove devices from an existing RAID device.

## Create and Assign a RAID Device

To create and assign a RAID device, follow these steps:

1. Choose Device Configuration from any of the following locations:
  - The BrightStor ARCserve Backup program group in the Start menu
  - The Configurations list in the BrightStor ARCserve Backup Manager interface
  - The Configurations menu in the BrightStor ARCserve Backup Manager interface

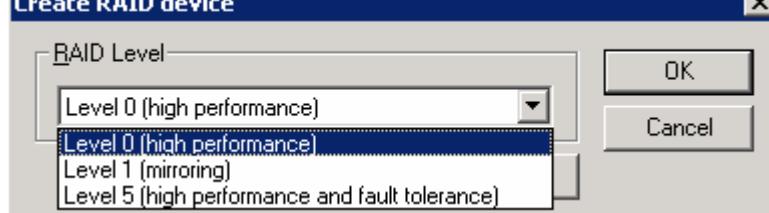
The Welcome panel of the Device Configuration dialog opens.

**Note:** It is also possible to configure RAID devices during installation.

2. Click Next to move to the Options pane.

**Note:** You must shut down the Tape Engine to perform this task. If the Tape Engine is currently running, you are asked to stop it. Click Yes to continue.

3. Select RAID Device and click Next. The Configure RAID Device dialog opens.
4. Click New. The Create RAID device dialog opens. Click More.



5. Define the type of RAID device you want to implement.
6. Click OK to create the RAID device and return to the Configure RAID Device dialog. The new RAID device is displayed on the RAID Device(s) list.
7. In the Available Devices list, select and assign the device or devices you want to add to the RAID device.

**Important!** RAID Level 1 must contain exactly two drives, and RAID level 5 must contain a minimum of three drives.

8. Click Finish to save the completed RAID device.

## Delete a RAID Device

To delete a RAID device, follow these steps:

1. Choose Device Configuration from any of the following locations:
  - The BrightStor ARCserve Backup program group in the Start menu
  - The Configurations list in the BrightStor ARCserve Backup Manager interface
  - The Configurations menu in the BrightStor ARCserve Backup Manager interface
  - This displays the Welcome pane of the Device Configuration dialog.
2. Click Next to move to the Options dialog.

**Note:** You must shut down the Tape Engine to perform this task. If the Tape Engine is currently running, you are asked to stop it. Click Yes to continue.

3. Select RAID Device and click Next. The Configure RAID Devices dialog opens.
4. Select the RAID device you want to delete in the RAID Devices list and click Delete.

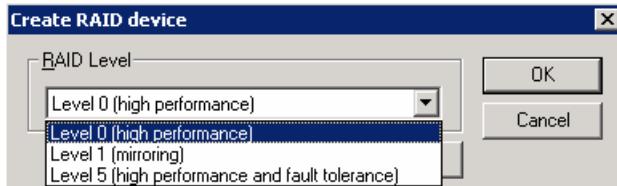
## Modify RAID Device Properties

To modify the properties of a RAID device, follow these steps:

1. Choose Device Configuration from any of the following locations:
  - The BrightStor ARCserve Backup program group in the Start menu.
  - The Configurations list in the BrightStor ARCserve Backup Manager interface.
  - The Configurations menu in the BrightStor ARCserve Backup Manager interface.
  - The Welcome pane of the Device Configuration dialog opens.
2. Click Next to move to the Options dialog.

**Note:** You must shut down the Tape Engine to perform this task. If the Tape Engine is currently running, you are asked to stop it. Click Yes to continue.

3. Select RAID Device and click Next. The Configure RAID Devices dialog opens.
4. Select the RAID device you want to modify in the RAID Devices list.
5. Click Properties. The Change RAID properties dialog opens. Click More.



6. Change the properties for the selected device and click OK.

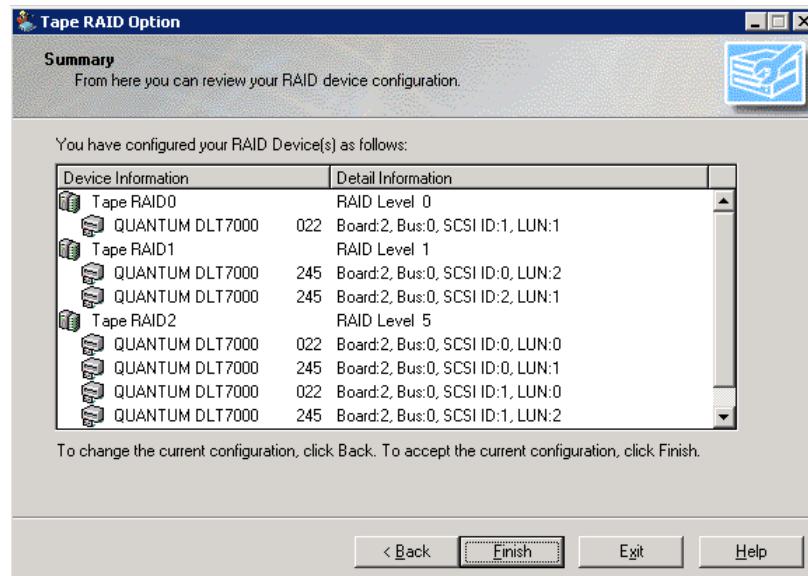
## View a RAID Device Summary

To view a summary of RAID devices, follow these steps:

1. Choose Device Configuration from any of the following locations:
  - The BrightStor ARCserve Backup program group in the Start menu.
  - The Configurations list in the BrightStor ARCserve Backup Manager interface.
  - The Configurations menu in the BrightStor ARCserve Backup Manager interface.
  - The Welcome pane of the Device Configuration dialog opens.
2. Click Next to move to the Options dialog.

**Note:** You must shut down the Tape Engine to perform this task. If the Tape Engine is currently running, you are asked to stop it. Click Yes to continue.

3. Select RAID Device and click Next. The Configure RAID Devices dialog opens.
4. Click Next. The Summary dialog opens with a summarized list of all RAID devices.



## Assign a RAID Device to a Group

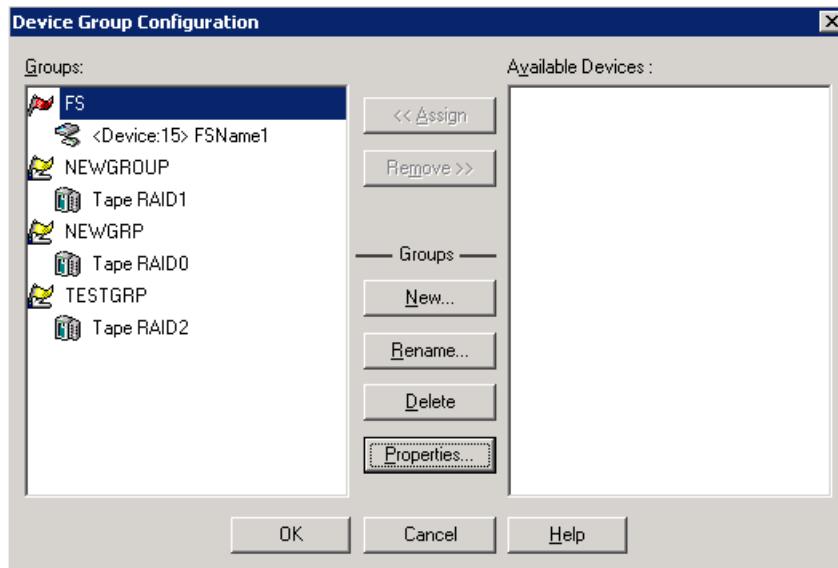
You should add the RAID device to a group in the Device Manager to perform backup, restore, or copy operations. If you do not assign the device to a group, BrightStor ARCserve Backup automatically assigns it for you.

On the Device Group Configuration dialog, the following color scheme distinguishes the group type:

This Color	Represents This Group
Red	Regular media group
Green	RAID group
Yellow	Tape Library RAID group

To assign a RAID device to a RAID group manually, follow these steps:

1. Open the Device Manager and click Group on the toolbar. The Device Group Configuration dialog opens, as shown in the following illustration:



2. To create a RAID group, click New. The New Group dialog opens.
3. Enter a name for the group in the Name field and click OK.
4. Assign the media RAID device to the RAID group and click OK.

The RAID device is now assigned to a RAID group.

**Note:** You cannot create or delete a group for the Tape Library RAID device from the Device Group Configuration dialog. It is created automatically.

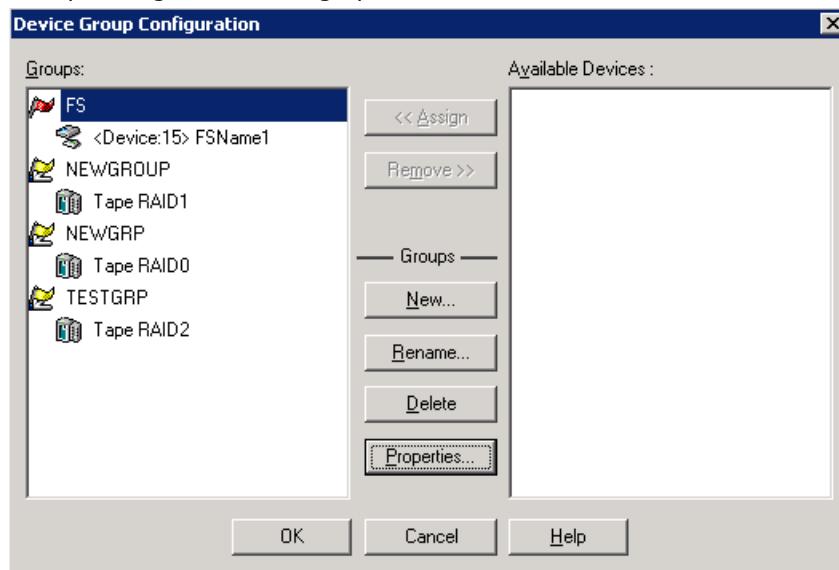
## Manage a RAID Group

You can manage RAID groups with the BrightStor ARCserve Backup Device Group Configuration feature. This dialog lets you perform the following actions:

- Create a new RAID group
- Delete an existing RAID group
- Change group properties
- Assign a device to a RAID group
- Remove devices from a RAID group
- Rename a RAID group

To perform any of these procedures, follow these steps:

1. Open the Device Manager and click Group on the toolbar. The Device Group Configuration dialog opens.



2. Select a RAID group in the Groups list and click the appropriate button to perform the task.

## Maintenance of a Tape RAID Media Set

You can use the Device Manager to format, erase, eject, or change compression for a RAID media set. For information on how to carry out these operations, see the the online help.

**Important!** *All media in a RAID media set are subject to formatting, erasing, ejecting, and changing compression. For example, if you select Format, all media in the drives comprising the specified RAID device are formatted concurrently.*

**Note:** To clean the drive, enable the hardware cleaning provided by the library.

## RAID Back Up and Restore Device Selection

Fault tolerance lets you continue your backup or restore even in the event of media or drive failure. The use of RAID 0 or RAID 5 improves backup and restore performance by distributing data over multiple drives. RAID displays in the BrightStor ARCserve Backup interface as a virtual drive and the special processing of the RAID backup is transparent.

- To back up data to a RAID device, select the RAID grouping as the destination in the Backup window and follow your standard backup procedures.
- To restore data from a RAID device, select the RAID grouping as the source in the Restore window and follow your standard backup procedures.

## RAID Performance Benefits

The BrightStor ARCserve Backup Tape RAID Option offers significant performance benefits to your backup system. You can monitor your system performance using the Windows Performance Monitor.

To maximize the performance of your system, ensure the following:

- The data bus can handle the increased data flow
- The drive array can support the increased data flow
- Software and hardware requirements are met
- Explore any degraded performance
- Optimize the buffer size

## Sources of Degraded Performance

When you perform backup and restore operations using the BrightStor ARCserve Backup Tape RAID Option, you may observe data transfer rates that are significantly lower than expected. Consider the following possible sources of degraded performance:

- If you use high performance drives, you may need to limit the number of drives per adapter; connecting more than one drive to the same board can significantly reduce performance.
- The speed of the hard disk you want to back up or restore can limit performance. Ensure that you have a hard disk that is fast enough to keep up with the data capabilities of your RAID implementation.
- Degraded media in one or more of the media drives reduces performance.
- Other applications may be accessing the hard disk during backup. This may degrade performance due to hardware limitations.
- The performance of a RAID device depends on the speed of the slowest drive attached. For example, in a three-drive RAID level 0 configuration where drive 1=100 MB/min., drive 2=120 MB/min., and drive 3=120 MB/min., the total throughput is 300 MB/min. Keep this information in mind when coordinating drives for RAID.

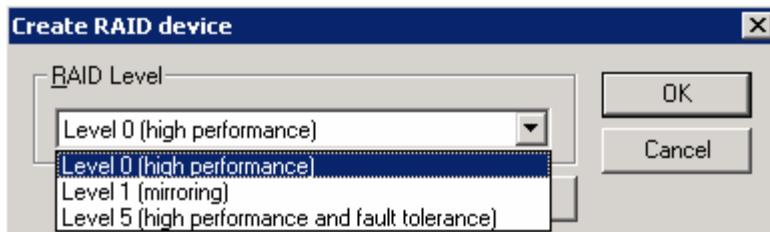
## Optimize Buffer Size

You can improve the performance of a backup or restore job by optimizing the buffer size. The optimum buffer size depends on the following factors:

- The media drive
- The hard disk
- The amount of memory in the system
- The number of jobs that are running simultaneously

You can determine the optimum buffer size for your environment by experimenting with a few different values. To set the buffer size, follow these steps:

1. Choose Device Configuration from any of the following locations:
  - The BrightStor ARCserve Backup program group in the Start menu.
  - The Configurations list in the BrightStor ARCserve Backup Manager interface.
  - The Configurations menu in the BrightStor ARCserve Backup Manager interface.
  - The Welcome pane of the Device Configuration dialog opens.
2. Click Next to move to the Options dialog.
3. Select RAID Device and click Next. The BrightStor ARCserve Backup RAID Option Setup dialog opens.
4. Select the RAID Configuration from the list, choose Properties, and click More. The following Create RAID device dialog opens:



5. In the Performance area, select one of the following options:
  - **Default**—BrightStor ARCserve Backup calculates and applies an optimum value.
  - **Custom**—Enter the buffer size in the New Buffer Size (KB) field. For example, to create a buffer size of 150 MB, enter **150000**.
6. Click OK to close the dialog and save your changes, and then close the remaining dialogs.

# Appendix A: Troubleshooting

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This appendix contains information to help you understand some of the error messages you may encounter when using the option. It also describes how to troubleshoot them.

## Messages

This section explains the most common messages for the BrightStor ARCserve Backup Tape RAID Option.

### **E6608: Tape length mismatch**

#### **E6608: Tape length mismatch**

##### **Reason:**

One of the media drives in a RAID level 1 media set has failed during the last backup to the media set and, as a result, there is less data on one drive than on the other drives.

##### **Action:**

ARCserve Backup uses the media with the most data on it and continues the job.

Check the associated drives for media failure or drive failure, and replace as required.

**E6623: Level has been changed from level 5 to level 0**

**E6623: Level has been changed from level 5 to level 0**

**Reason:**

When the ARCserve Backup Tape RAID Option starts, it checks each RAID device and verifies that all RAID devices are configured correctly. If it finds a RAID device configured as level 5 and it does not find the minimum three drives required for level 5, it automatically changes the RAID level to 0. This can happen by mistake if one of the media drives is not switched on when the option starts.

**Action:**

To access devices that are switched on after the option starts, run any utility that rescans the SCSI bus, such as windisk.exe.

- Ensure that:
- A minimum of three drives is assigned.
- All drives are operating.

All drives are configured for RAID level 5.

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