



## ReadyDATA Performance Considerations

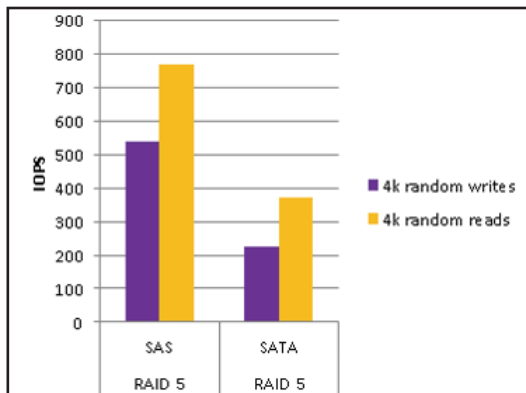
### Did I Purchase the Right Disk Type?

ReadyDATA supports several disk types to meet the performance requirements of various storage applications. The hard disk drives (HDDs) that NETGEAR offers with ReadyDATA systems differ in capacity, performance, and price. To determine the type and number of HDDs for a ReadyDATA system, first consider the level of performance that you require, then determine the RAID configuration that you intend to use, and finally consider the usable capacity of the ReadyDATA system.

Many network environments require high performance volumes, while for other environments, capacity is equally important. The combination of the selected RAID type and HDDs determines the performance and capacity of a volume.

HDD	Description	Storage Capacity	Performance	Conclusion
<b>SATA</b>	Serial ATA drive 7,200 rpm	1 TB, 2 TB, 3 TB, and 4 TB	Low	SATA disks offer large storage capacity, but compared to SAS and SSD disks, the lowest performance.
<b>SAS</b>	Serial attached SCSI drive 15,000 rpm	300 GB, 450 GB, and 600 GB	High	SAS disks deliver a better performance than SATA disks but offer more limited storage capacity.
<b>SATA SSD</b>	Serial ATA solid-state drive	50 GB, 100 GB, and 200 GB	Highest	SSD disks outperform SATA and SAS spindle disks but are more expensive and offer limited storage capacity. You can use SSD disks as boost disks in a hybrid volume.

The following figure shows the performance, measured in Input/Output Operations Per Second (IOPS), for random reads and writes using a 4k block size on SAS and SATA disks. For performance-sensitive applications, such as virtualization and iSCSI volumes, NETGEAR recommends SAS drives.



### I am concerned that I might have purchased the wrong disk type. What can I do?

Contact your reseller to discuss your storage performance requirements and ask them to involve a NETGEAR sales engineer or representative in the conversation. You might be able to exchange your disks for a type that better suits your needs.

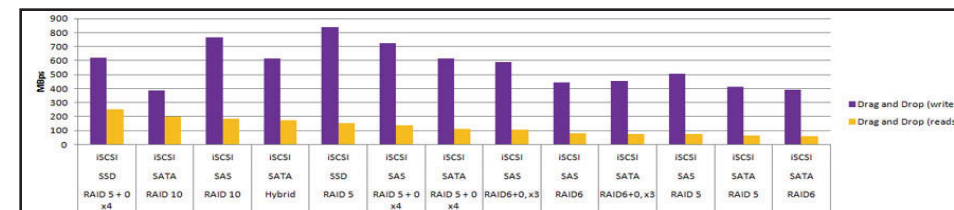
### How Should I Configure My Volume?

The selection of the RAID type and the types of HDDs determine the performance of a volume.

The following table compares RAID types and performance when all volumes have the same types of HDDs (except for the hybrid volume, which also includes SSD boost disks).

RAID Type	Performance
RAID 10	<ul style="list-style-type: none"> <li>Highest throughput performance and highest number of IOPS compared to the other RAID types.</li> <li>Requires one mirror disk for each storage disk.</li> </ul>
Hybrid RAID 5+0 with 3 boost disks	<ul style="list-style-type: none"> <li>The expansion allows for highly increased performance compared to RAID 5 without boost disks.</li> <li>Requires one parity disk for each expansion.</li> <li>Requires a minimum of two drive bays for boost disks.</li> </ul>
RAID 5+0	<ul style="list-style-type: none"> <li>The expansion allows for increased performance compared to RAID 5 without expansion.</li> <li>Requires one parity disk for each expansion.</li> </ul>
RAID 6+0	<ul style="list-style-type: none"> <li>The expansion allows for increased performance compared to RAID 6 without expansion.</li> <li>Requires two parity disks for each expansion.</li> </ul>
RAID 5	<ul style="list-style-type: none"> <li>Low performance compared to the other RAID types.</li> </ul>
RAID 6	<ul style="list-style-type: none"> <li>Lowest performance compared to the other RAID types.</li> </ul>

The following figure shows a performance comparison of RAID levels. A RAID 10 volume provide the highest overall performance, while RAID 5 and RAID 6 volumes provide the lowest performance.



For information about NETGEAR's recommendations for RAID levels for specific storage applications, see [Recommendations for Storage Applications](#).

## Volume Capacity and Performance

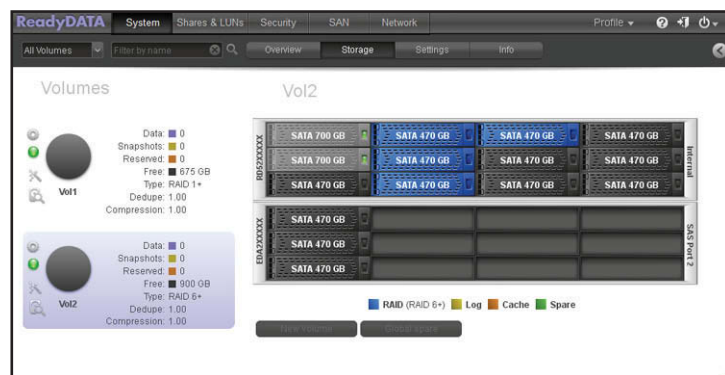
To maintain consistent storage performance, do not exceed 80 percent capacity usage of a storage volume. If the volume capacity exceeds 80 percent and data on the volume is updated frequently, the volume performance might degrade because the ReadyDATA system must spend more time to find unused space on disks to write new data. Furthermore, the system writes new data using noncontiguous disk sectors, causing fragmentation, which reduces the read performance.

If a volume approaches 80 percent used capacity, add more disk capacity by using ReadyDATA instant volume expansion, which lets you insert disks and add them to an existing volume without any downtime.

### To monitor free space on a volume:

1. Log in to the ReadyDATA system using the default or your personalized login credentials. The Dashboard home screen displays.
2. Select **System > Storage**. The Storage screen displays.

The following figure shows two volumes, unused disks, and an optional expansion disk array. Used and free space display on the left of the screen.



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203-11339-01

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February 2014

## Recommendations for Storage Applications

The following table summarizes NETGEAR's recommendation for specific storage applications.

**IMPORTANT:** For any configuration, to maintain consistent performance, do not exceed 80 percent volume capacity utilization.

Application	Recommendation
VMware ESXi	<ul style="list-style-type: none"> <li>• For highest performance, use RAID 10 with 15k rpm SAS drives.</li> <li>• For lower performance requirements, use hybrid storage (SATA drives in RAID 10 with SSD drive caching).</li> <li>• For ease of management and snapshot efficiency, use NFS (rather than iSCSI) with replication.</li> <li>• Compression is optional, but do <i>not</i> use deduplication for virtualization.</li> <li>• Ensure that vStorage APIs for Array Integration (VAAI) are disabled on VMware servers.</li> </ul>
Hyper-V, Citrix, KVM, and other hypervisors	<ul style="list-style-type: none"> <li>• For highest performance, use RAID 10 with 15k rpm SAS drives.</li> <li>• For lower performance requirements, use hybrid storage (SATA drives in RAID 10 with SSD drive caching).</li> <li>• Use iSCSI with thin LUNs that have a block size of at least 64 KB and match the block size with the formatted file system.</li> <li>• Compression is optional, but do <i>not</i> use deduplication for virtualization or iSCSI applications.</li> </ul>
Databases, mail servers (Exchange), and other performance-sensitive applications	<ul style="list-style-type: none"> <li>• Use RAID 50 with disk groups that are no larger than six disks.</li> <li>• For environments with a high number of concurrent users or connections, you can use hybrid storage (SATA drives with SSD drive caching).</li> <li>• Compression is recommended.</li> </ul>
File serving	<ul style="list-style-type: none"> <li>• Use RAID 50 with disk groups that are no larger than six disks.</li> <li>• For environments with a high number of concurrent users or connections, you can use hybrid storage (SATA drives with SSD drive caching).</li> <li>• Compression is recommended.</li> </ul>
Backup and video surveillance	<ul style="list-style-type: none"> <li>• Use RAID 50 with disk groups that are no larger than nine disks.</li> <li>• Compression is recommended.</li> <li>• Enable deduplication <i>only</i> if you have installed a read cache SSD disk.</li> </ul>

## For More Information About Performance

For more information about ReadyDATA performance, see the *Volume Performance and Configuration on ReadyDATA Platforms* white paper at <http://www.netgear.com/business/products/storage/readydata/readydata-series.aspx#tab-resources>.

## Support

Thank you for selecting NETGEAR products.

To register your product, get the latest product updates, get support online, or for more information about the topics covered in this manual, visit the support website at <https://my.netgear.com>.

Phone (US & Canada only): 1-855-RDYDATA (1-855-739-3282).

Phone (Other Countries): Check the list of phone numbers at <http://support.netgear.com/general/contact/default.aspx>.

Warranty: 5 years with next business day hardware replacement included for the first 3 years.

NETGEAR offers the following ProSupport service packs:

- PMB0314. OnCall 24x7, 1 year
- PMB0334. OnCall 24x7, 3 years
- PMB0354. OnCall 24x7, 5 years
- PMPX1123. Extended next business day replacement
- PSB0304. Professional setup and configuration (remote)
- PSP1104. Professional setup and configuration (on-site)
- PDR0134. Defective drive retention, 3 years
- PDR0154. Defective drive retention, 5 years