Synology®

A NEW NAS Experience

a white paper

Growth Solutions for Data Storage

Meeting the Needs Now and in the Future for Small Business

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Introduction:

Businesses everywhere are facing the day to day challenge of managing an ever increasing volume of digital assets. From small businesses to large enterprises, the growth in the internet has resulted in an enormous challenge to effectively and affordably manage, store and archive digital files.

In small to medium sized businesses, often a solution to manage and store digital files is put into place based on existing needs, at the time of need, constrained by budgets and without a strategy for future growth and expansion. Often these solutions are either a PC server or an external hard drive. This scenario can later result in a system where growth is either not physically possible, due to limited hardware configurations or is cost prohibitive to add-on.
Small and medium sized businesses should look for a storage and file management solution that allows for growth incrementally through hardware, growth through performance and is packaged in an affordable and easy to manage system. By looking at the ability of a product to grow as the organization grows, many unforeseen future problems can be avoided.

There are four common ways to ensure that the file management and backup system will support growth as the data storage needs of the organization grows;

- Vertical Expansion
- Horizontal Expansion
- Plug and Play
- System Migration

Network Attached Storage (NAS) systems can be an ideal solution for growing companies that need expansion capabilities and affordability in an easy to use system. While some NAS systems do not allow for all four of the growth scenarios, the Synology Disk Stations are network attached storage devices aimed at small to medium sized businesses that support all of the four expansion models. Due to the rich features, expansion capabilities and affordability, Synology Disk Stations are considered an ideal file management and data backup solution to support growing companies.

A typical Synology Disk Station deployment is outlined below in Figure 1

Figure 1 - Synology Disk Station Deployment

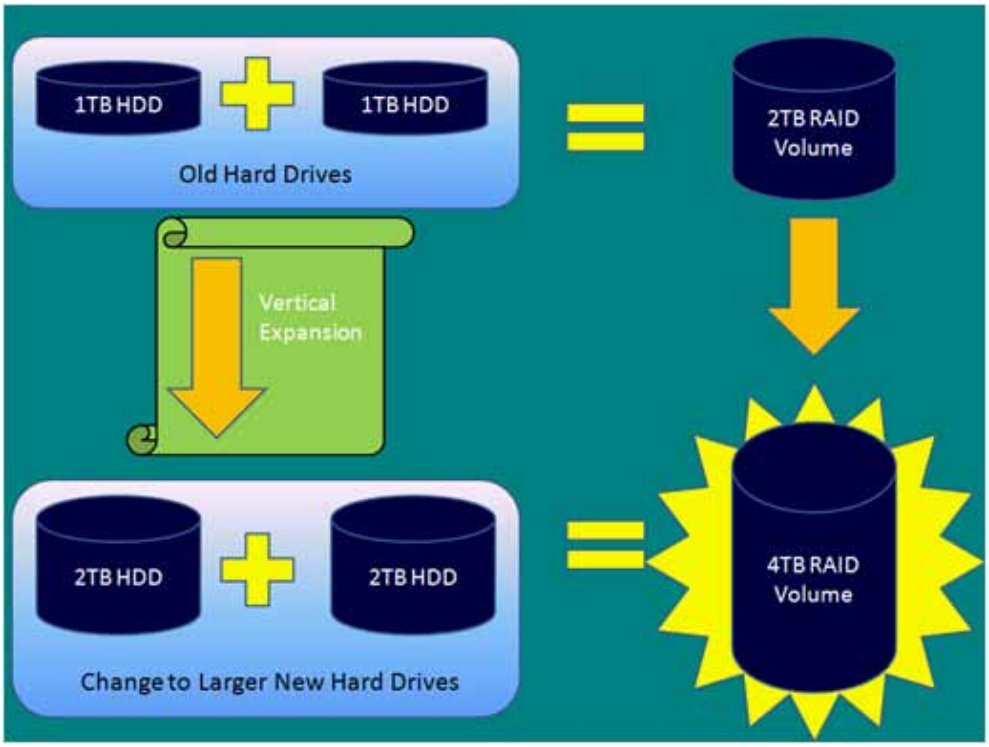
Vertical Expansion

With vertical expansion, growth is achieved by expanding the storage volume with larger hard drives. Vertical expansion greatly benefits administrators who must start out with less costly, smaller hard drives but will later need more storage capabilities. Vertical expansion is a cost effective method of expanding storage capabilities within a single machine by replacing existing hard drives with larger sized hard drives. The Synology Disk Stations support up to 2TB hard drives per bay.

How to Grow with Vertical Expansion

Vertical expansion requires that the system is setup with a redundant RAID Volume (RAID-1, RAID-5, RAID-5+Hot-Spare, RAID-6).

While the Volume is healthy, an existing disk is replaced with a newer, larger disk. The Synology Disk Station will warn the administrator that the volume is in degraded mode. The warning beeper can be turned off, and then the volume rebuilt. This process should be repeated with all disks that are to be replaced. After all larger disks have been installed and the volume is healthy, the expansion wizard is then run in order to expand the volume onto the additional hard drive space.

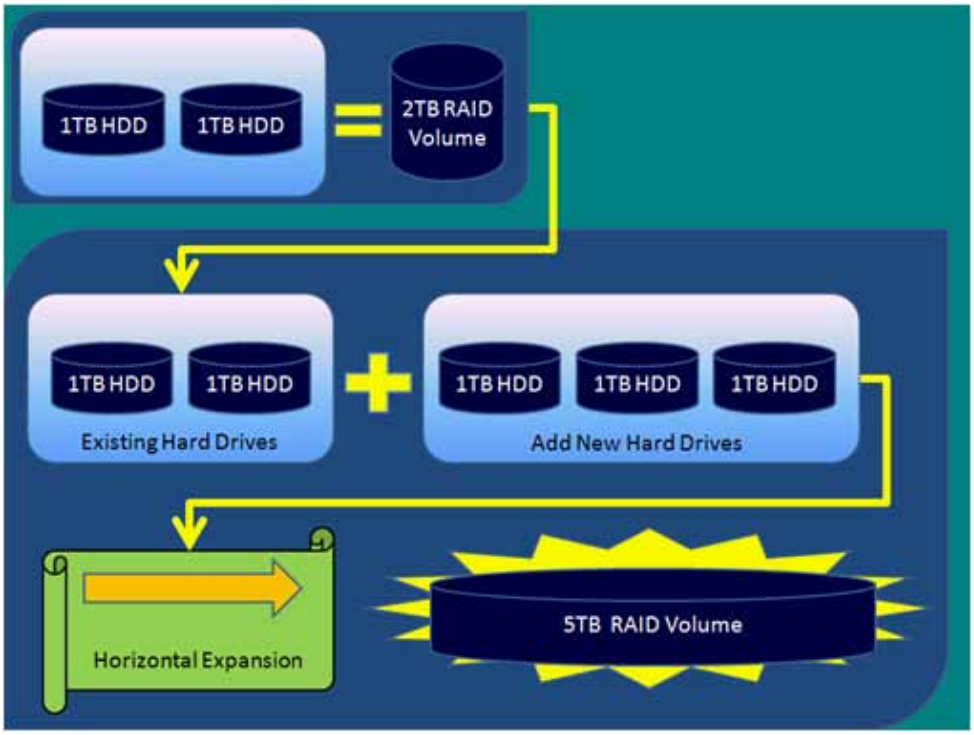


Advantages of Vertical Response	Disadvantage of Vertical Expansion
Allows for easy growth of disk space	Duration of expansion can take hours to days depending upon system performance and total size/ volume of disk drives
Small initial disk investment	If an error (disk error, power failure) occurs during the expansion, it cannot be returned back to the original form and data loss may occur.
Online Expansion. No need to shutdown a Synology Disk Station or have interrupted services. • For Synology Hot-Swap models ONLY • Cold-Swap models require that the system be shutdown to replace any disks.	

Horizontal Expansion

With horizontal expansion, growth is achieved by expanding the storage volume with additional hard drives. Horizontal expansion or “volume reshape” greatly benefits administrators who must start out with only one or two hard drives due to cost, but plan on adding additional drives and storage capabilities in the future. Horizontal expansion can be achieved by either upgrading from a two-bay product to a higher bay count product, or by starting out with a multi-bay product that

has bays un-used. Horizontal expansion is an affordable solution to expanding storage capabilities because you only invest in the drives you need today but can plan for future growth.



How to Grow with Horizontal Expansion

Horizontal Expansion requires a multi-bay product, with a minimum of 1 hard drive installed. When needed, additional disks can be purchased and added to the unit. In order to make sure that additional disks are installed within the Synology Disk Station there are protocols that should be followed based on the existing setup.

Changing from Basic to RAID-1/RAID-5

- Using the Synology Change RAID-type Wizard, select “Volume1” and start the “Change” Wizard. From here, the administrator has to select what type of RAID-level that s/he would like to update to. After selecting a “Destination RAID-type”, the system will undergo the horizontal expansion onto the destination disks. *Note, when changing from Basic/RAID-1 to RAID-5, services are interrupted for a few moments.

Changing from x-disk RAID-5 to y-disk RAID-5

- y = 4 or 5

- x = y - 1
- Use the Disk Expand Wizard to Expand a x-Disk RAID-5 Volume onto a y-Disk RAID-5 Volume

Changing from RAID-5 to RAID-5+Hot-Spare

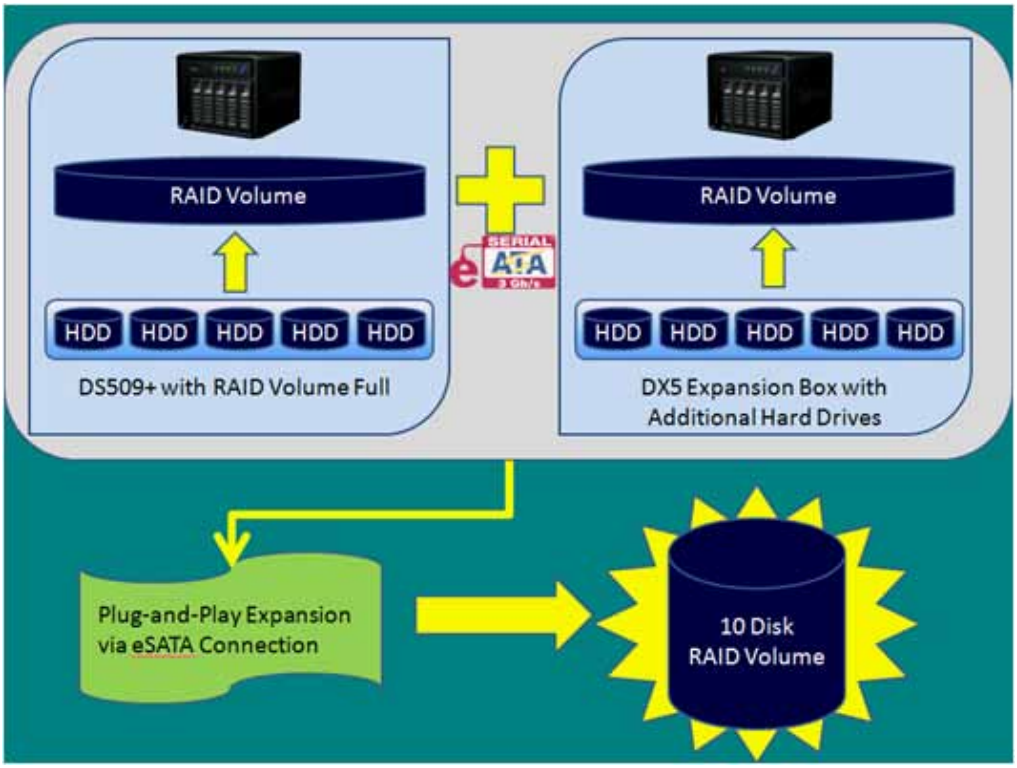
- Use the Volume Change Wizard to change existing RAID-5 Volume into RAID-5+Hot-Spare

Advantages of Horizontal Expansion	Disadvantages of Horizontal Expansion
Allows for affordable growth into higher-count bay models	At is online disk migration, the process can take from hours to days depending upon system performance and size of disk(s)
Drive investment is minimal so savings can be invested into higher-end models with larger growth potential	Requires initial investment into a multi-bay unit rather than a single drive NAS.
• Semi-online Expansion – Services are hardly interrupted *cold-swap models will require the Disk Station by shutdown during disk installation	If an error (disk error, power failure) occurs during the expansion, it cannot be returned back to the original form and data loss may occur.

Plug-and-Play Expansion

Plug-and-Play Expansion, or the ability to “scale-out” is the ability to expand your storage capabilities “on the fly” and without turning off your system by simply adding an expansion box. The benefits of having storage expansion “on the fly” are great. Multi-media offices where a sudden surge of file sizes and storage space is required, will not miss a beat with plug-and-play expansion. Administrators who need to expand storage but can’t afford to have any downtime benefit as the data on their Synology DS509+ will not be affected during PnP Expand.

Simply put, plug-and-play expansion on the Synology Disk Stations works with the DS509+ 5-bay Disk Station and the DX5 5-bay expansion model, supporting up to 10TB of extra drive space, making the combined storage capabilities of the DS509+ and DX5 a total of 20 TB of storage across 10 bays. In addition to the 5-bay Disk Stations, the RS409+ and the RS409RP+ rack mount Disk Stations also offer plug-and-play capabilities by expanding to the RX4 expansion box, supporting an additional 4 bays of storage for a total of 16TB of storage across 8 bays with the RS409+ and RX4 or the RS409RP+ and RX4.



How to Grow with Plug and Play Expansion

To benefit from the full plug-and-play expansion features, a DS509+, RS409+ or RS409RP+ is required. When one of these models is nearing maximum capacity across all bays of storage, it is time to expand the storage volume. Either a DX5 or a RX4 expansion box will need to be purchased and at least 1 hard drive will need to be installed into the expansion box. Plug the expansion box (DX5/RX4) into the existing Disk Station (DS509+, RS409+ or RS409RP+) using 1 eSATA cord. Then the Volume Expand wizard is used to expand the existing Disk Station RAID volume onto the expansion box volume. *DX5/RX4 volume can also be expanded via Horizontal Methods, with the same limitations and benefits.

Advantages of Plug-and-Play Expansion	Disadvantages of Plug-and-Play Expansion
No Migration or manipulation of disks on the DS509+, RS409+ or RS409RP+ is needed	Requires initial investment of the DS509+, or the RS409+, RS409RP+
Easy installation of plugging in one eSATA cable, and begin using the expansion box right away	
No need to invest in another multi-bay unit for data management with expansion box.	
Allows for the creation of a 10 Disk RAID Volume	
Vertical and Horizontal Expansion benefits still apply	
Shortest process time	

System Migration

System Migration is an often overlooked method of growth, until the time comes when the existing system is full and a new solution is sought. When a system reaches its maximum capacity in both disk space and number of disks, Data Migration is required and the perils of moving data between two systems surfaces. Finding a new system that can easily accommodate the data from the old system can be a challenge for any sized organization. The ability to move your data stored on one system to a larger system is probably one of the most frequent challenges that growing businesses face. Finding a storage solution that not only allows the flexibility to start small but also supports growth in a variety of ways is a must for any small business.

How to Grow with System Migration

To realize the full benefits of system migration, a Synology multi-bay system with a minimum of one disk and a destination drive is required. After a configuration backup is created (contains users, groups, permissions, root share structure and database backup), simply remove the HDD from the old Synology Disk Station and install them into the new Synology Disk Station. Using the Synology Assistant, update the OS on the newly installed old HDD. Restore the configuration and database backup and it's done. When using compatible storage solutions, system migration is a very simple process.

Advantages of System Migration	Disadvantages of System Migration
Allows easy performance upgrade by moving data to a higher performing system	Off-line migration
Administrator can start out with an economical 2-bay model, and eventually migrate to a higher performing 2, 4 or 5 bay model.	

Planning for Storage Growth as Your Organization Grow

Real Life Results

Scenario 1 – Backup Application

A small department with a small IT budget may purchase a unit for office backup, the administrator of this department may start out with a DS207+ with 500GB Disks. As the department sizes increases, data storage requirements will increase as well. In this situation, the administrator can proceed with installing 1TB or 2TB disks within the DS207+ and conduct a vertical expansion. Because the downtime is minimal (time required to swap disks), the swapping of the disks can be conducted when no user is using the backup server, and afterwards, the volume can be expanded without interrupting the backup service.

Scenario 2 – Multimedia Office

For multimedia office, spontaneous data growth can be sudden and demanding – the need for data storage expansion must be done without down time. As this office made the initial investment into the DS509+ for high performance, high capacity storage, this particular office suddenly

required additional storage for a new project. This requirement in expansion also dictated that this office cannot stop or interrupt their day-to-day operations while the file server was updated to have additional storage. The DX5 meets this requirements as it supports Plug-and-Play Expansion. Using a simple eSATA connection, this office can quickly begin to expand their storage requirements onto the DX5 – all with no down time, and no system migration of any kind. This allows for the existing data shares to continue to their work, and never notice that their storage capacity is being increased in the background.

Scenario 3 – Affordable growth

A small office, with the initial expectation that they need affordable storage now, and eventually grow their storage needs in a few years, initially makes a purchase of a CS407e with 2 HDDs in RAID-1. As predicted, in a couple of years, this office required additional storage and decided to go the horizontal method of expansion. By adding an additional two HDDs within the CS407e, this administrator was able to expand the RAID volume onto four hard drives – with hardly any down time. This method kept costs down in the initial term, and when it was time to expand the storage needs of the CS407e, it was affordable to do so as the company was larger, and had extra resources to dedicate to file storage.

Scenario 4 – Growing Start-up's

When a start-up opens up, usually, this new company has no idea how much storage is needed by their office. Due to a small budget, this office initially starts out with a DS207 and 500GB HDDs. This allowed enough initial space for this office to share data amongst is employees, share data with their customers, and provide a place for backup storage. As their office grew in a couple of years, their storage requirements increased as well. This has resulted in using vertical expansion to expand their storage to the largest capacity of drive at the time, using 1.5TB. This allows for an abundant amount of space to store their data. A few years down has gone, and this small start-up has grown up to be a regional office, with additional departments, all demanding increased performance and storage. Because of the increase demand in performance, this office decided to migrate to a high end DS409+ model, with the same existing 1.5TB HDDs. Moving the existing HDDs into the DS409+ allows for instant performance growth, as the DS409+ has the improved performance to meet the growing needs of the start-up office. Additionally, given the new creative department within now this regional office, additional storage is required. Given the extra two bays within the DS409+, this office was able to use horizontal expansion to ex-

pand their existing RAID volume onto the two additional hard drives, providing additional storage growth for their new departments.

Summary

Businesses of all sizes should look to implementing storage solutions that offer growth and expansion capabilities as their organization grows. Growing offices, can plan for the future by using any of the four expansion methods; growing by expanding disk capacity, increasing the amount of disks within the RAID volume, or growing in hardware performance. Ideal small business solutions will encompass all four growth expansion methods as they will be the most cost-effective over time and allow for the greatest of options. Synology Disk Stations meet the needs of growing business through any of the four expansion methods.

Key Questions for Determining the Best Growth Methods For Your Organization

1. Storage growth requirements (now and in the future – taking into consideration rate of growth)
2. Storage/file availability requirements (can the system be down for expansion?)
3. Budget limitations

	Vertical	Horizontal	PnP Expand	Sys Migration
Initial Investment	Minimal	Moderate	Moderate	Minimal
Admin Time to Implement	Moderate	Moderate	Minimal	Moderate
Potential Downtime	Minimal	Minimal to Moderate	None	Moderate
Processing Time	Potentially Heavy	Potentially Heavy	Short	Moderate
Online Expansion?	Yes	Yes	Yes	No

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