

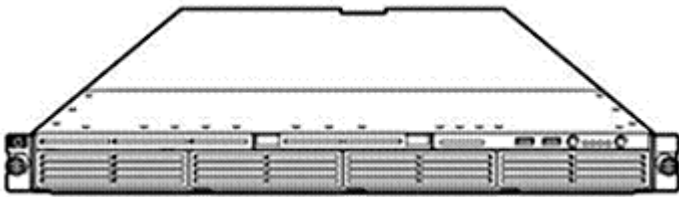
Overview

Struggling with complex, distributed, and costly data protection? You need a disk-based backup system that delivers leading price-performance, deduplicates backup data, and automatically consolidates multiple servers into a single backup process.

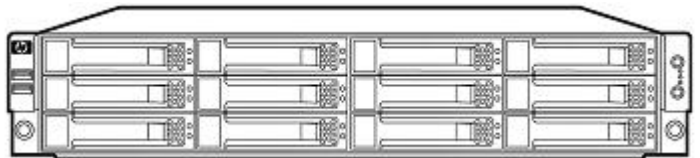
The HP StorageWorks D2D Backup Systems with HP StoreOnce deduplication provide disk-based data protection for data centers and remote offices. Automate and consolidate the backup of multiple servers onto a single, rack-mountable device while improving reliability by reducing errors caused by media handling. All HP D2D Backup Systems feature HP StoreOnce deduplication software for efficient, longer term data retention on disk and enabling network efficient replication for a cost-effective way of transmitting data off-site for disaster recovery purposes. The D2D Backup Systems integrate seamlessly into your current IT environment and offer you the flexibility of both virtual tape library and NAS* targets.

NOTE: Actual performance is dependent upon data set type, compression levels, number of data streams, number of devices emulated and number of concurrent tasks, such as housekeeping or replication.

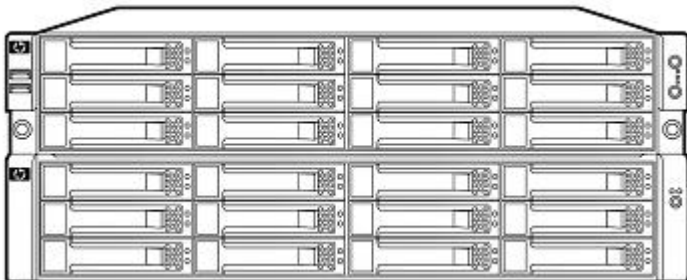
* For legacy D2D backup systems (EJ001A, EJ002A, EH938A, EH939A, EH941A, EH942A, EH999A), the addition of NAS as a target for backup is limited to the CIFS protocol, suitable for use in Windows-only environments. Earliest legacy systems used authentication models for the CIFS protocol of "no authentication" or "local user level authentication". There was no support for Microsoft Active Directory authentication. However support for Microsoft Active Directory authentication is available on legacy systems via a free firmware upgrade by following the "Support & Drivers" link on www.hp.com/go/d2d or by following the "HP Support & Drivers" link from: www.hp.com EJ001B, EJ002B, EH999B, EH996A, EH998A and EH983A support CIFS, with Microsoft Active Directory authentication and NFS protocols.



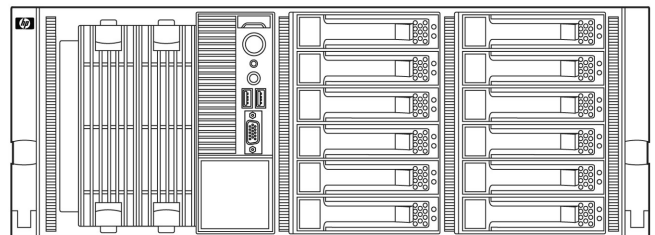
HP StorageWorks D2D2500 Backup System



HP StorageWorks D2D4000/4106 Backup System



HP StorageWorks D2D 4106 and D2D4112 Backup System with D2D4106 or D2D4112/4312 Upgrade Kit



HP StorageWorks D2D4312 Backup System

Overview

What's New

- HP StorageWorks D2D4312 Backup System for enterprise data centers delivers a scalable 4U solution from 9 to 36 TB of usable capacity. The highest capacity and performance* point in the HP D2D Backup System family, it automates the daily backup of multiple servers through the flexibility of virtual tape library and NAS (CIFS & NFS) interfaces.
- The HP StorageWorks D2D4106 Backup System for 'remote or branch offices and smaller data centers', the 2U Backup system delivers a scalable solution from 4.5 to 9 TB of usable capacity using a simple and cost effective 2U capacity upgrade. These devices automate the daily backup of multiple distributed servers through the flexibility of virtual tape library and NAS interfaces.
- HP StorageWorks D2D Replication Management software**, an easy way for customers to manage a large number of D2D backup systems that are being replicated to a central site. This software provides basic management capabilities in a replication environment for numerous D2D backup systems and download instructions are included with the D2D's replication license
- HP StorageWorks OST plug-in integrates de-duplicated replication with Symantec backup applications.

* Actual performance is dependent upon data set type, compression levels, number of data streams, number of devices emulated and number of concurrent tasks, such as housekeeping or replication.

** Replication Manager software is available with the following replication licenses (EH991A, EH994A, EH984A, EH999A). In order to benefit from Replication Manger, D2D backup systems require the latest firmware, which can be obtained via a free firmware upgrade by following the "Support & Drivers" link on www.hp.com/go/d2d or by following the "HP Support & Drivers" link from: www.hp.com



Features and Benefits

Disk-based storage	D2D Backup Systems allow you to retain daily backup data on disk, providing ready access to backup sets for rapid restores.
Hands-free daily backup	HP StorageWorks D2D Backup Systems work with your backup application to help automate and improve the backup process while reducing the time spent managing data protection. Implementing unattended daily backup is especially valuable for environments with limited IT resources.
Consolidate the backup of multiple servers	D2D Backup Systems can simultaneously back up multiple servers on a standard Ethernet or Fibre Channel network to a single disk-based solution. Streaming multiple backups to a single D2D system delivers greater backup performance, and helps to reduce your backup window.
Retain typically 20 times more backup data on disk	HP StoreOnce deduplication reduces the disk space required to store backup data sets by typically 20x without impacting backup performance. Retaining more backup data on disk for longer, enables greater data accessibility for rapid restore of lost or corrupt files and reduces impact on business productivity while providing savings in IT resource, physical space, and power requirements.
Data replication	<p>The HP D2D Backup Systems with HP StoreOnce deduplication reduces the network bandwidth needed to transmit data offsite. This enables cost-effective, network efficient data replication to automate and centralize backup from remote sites or branch offices, and delivers a consolidated disaster recovery solution for the data center. Replication manager*, included with the replication license, provides an easier way to centrally manage a large number of devices being replicated to a central site. HP's OST plug-in enables Symantec backup applications (i.e. Backup Exec or NetBackup) to be aware of replicated copies of data.</p> <p>* Replication Manager software is available with the following replication licenses (EH991A, EH994A, EH984A, EH999A). In order to benefit from Replication manager, D2D backup systems require the latest firmware, which can be obtained via a free firmware upgrade by following the "Support & Drivers" link on www.hp.com/go/d2d or by following the "HP Support & Drivers" link from: www.hp.com</p>
Scalability	Most HP D2D Backup Systems (apart from the entry level D2D2500 series), allow you to grow usable capacity as your backup data requirements grow. The D2D4312 allows you to scale up from 9 to 36TB of usable capacity, The D2D4112 from 9 to 18 TB of usable capacity and the D2D4106 from 4.5 to 9 TB of usable capacity as your data storage requirements grow, by using a simple and cost effective capacity upgrade for a lower cost alternative to purchasing additional systems.
Seamlessly integrates into current environments	The D2D Backup Systems offer virtual tape library and NAS targets for backup applications allowing for ease of use and integration in to existing IT environments. 1U, 2U, 4U D2D Systems are easily rack-mounted in standard racks for efficient use of space in the data center and remote offices. Supported by all leading backup applications, this allows each D2D System to be installed and used without additional investment in software.
Supports remote management	D2D Backup Systems offer an intuitive web-based browser interface allowing you to monitor your D2D Backup System, locally or remotely, to view results or change settings. This self-managing device also reduces your routine maintenance.
Proven RAID technology	D2D Backup Systems include hardware-based RAID 5 or RAID 6 to reduce the risk of data loss due to disk failure.



Features and Benefits

Direct or network attach to tape for tape archive

Legacy D2D Backup Systems* can be directly or network attached to stand alone tape drives, tape autoloaders and tape libraries providing a cost-effective long-term archival solution using tape, or to transport data offsite for disaster recovery purposes where data replication is not an option.

The direct tape attach method of data offload is not recommended, as it has significant management and performance limitations.

The highest performance option is a separate physical tape backup, as it uses the backup application to create a completely separate tape backup from the server to a physical tape drive or library in parallel to the D2D backup.

* Legacy D2D backup systems are (EH993A, EH938A, EH939A, EH941A, EH942A, EJ001A, EJ002A)

Special Features

HP StoreOnce deduplication - keep more data on disk for longer

Data deduplication is a method of reducing storage needs by eliminating redundant data so that over time only one unique instance of the data is actually retained on disk. As a result, typically 20x more backup data can be retained in the same disk footprint.

Adding data deduplication to disk-based backup delivers a number of benefits:

- A cost effective way of keeping your backup data on disk for a number of weeks or even months. More efficient use of disk space effectively reduces the cost-per-gigabyte of storage and the need to purchase more disk capacity.
- Making file restores fast and easy from multiple available recovery points. By extending data retention periods on disk, your backup data is more accessible for longer periods of time, before archiving to tape. In this way, lost or corrupt files can be quickly and easily restored from backups taken over a longer time span.
- Ultimately, data deduplication makes the replication of backup data over lower bandwidth WAN links viable (providing offsite protection for backup data) as only changed data is sent across the connection to a second device (either a second identical device or one that comes from this product family).

HP StoreOnce deduplication

HP StoreOnce deduplication software simplifies the deployment of deduplication technology across IT infrastructures. With explosive data growth driving IT sprawl, deduplication technology is quickly becoming a requirement for many customers to help reduce the capacity required to store information.

- Traditional deduplication technologies tend to approach the problem from a fragmented perspective and this results in multiple deduplication methodologies being deployed adding to the management complexity of the infrastructure. HP StoreOnce is different; as a next generation deduplication architecture, it is not sold as standalone software, but rather is a portable engine that can be consistently embedded in multiple products, eliminating the complexity of first generation deduplication. HP StoreOnce uses patented innovation and features designed by HP Labs to maximize backup and restore performance while minimizing management and hardware overhead.

How it works

Deduplication works by examining the data stream as it arrives at the storage appliance, checking for blocks of data that are identical and eliminating redundant copies. If duplicate data is found, a pointer is established to the original set of data as opposed to actually storing the duplicate blocks, removing or



Features and Benefits

"deduplicating" the redundant blocks from the volume. The key here is that the data deduplication is being done at the block level to remove far more redundant data than deduplication done at the file level where only duplicate files are removed.

Data deduplication is especially powerful when it is applied to backup, since most backup data sets have a great deal of redundancy. The amount of redundancy will depend on the type of data being backed up, the backup methodology and the length of time the data is retained.

Example. Backing up a large customer database that gets updated with new orders throughout the day. With the typical backup application you would normally have to back up, and store the entire database. Even incremental backups will result in storing the full database to disk once again, taking up increasing amounts of disk space with almost identical backup data sets. With block-level deduplication, you can backup the same database to the device on two successive nights and, due to its ability to identify redundant blocks, only the blocks that have changed will be stored. All the redundant data will have pointers established.

The HP approach to deduplication

HP StoreOnce deduplication software simplifies the deployment of deduplication technology across IT infrastructures. With explosive data growth driving IT sprawl, deduplication technology is quickly becoming a requirement for many customers to help reduce the capacity required to store information.

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HP Dynamic Deduplication was featured on earlier generations of HP D2D Backup solutions. HP D2D Backup systems now feature HP StoreOnce deduplication which uses an optimized in-line process to provide enhanced performance and is architected to be portable to other HP products in the future. Most D2D customers using Dynamic deduplication can upgrade their firmware to improve performance and enable replication to newer systems based on HP StoreOnce.

NOTE: The HP VLS product family uses deduplication based on object-level data deduplication for increased performance in large scale Fibre Channel deployments. These deduplication technologies are not compatible; they use different technologies and cannot be used together.

For more information on HP StoreOnce deduplication refer to the white papers available on <http://www.hp.com/go/d2d>

What deduplication ratio can I expect?

The actual data deduplication ratio you can expect will depend on a number of factors including: the type of data, the backup methodology used, and the length of time you retain your data. However, assuming standard business data mix and extended on disk retention (periods of more than 12 weeks) you could expect to see:

20:1 capacity ratio assuming a weekly full and daily incremental backup model

Is there likely to be any impact on performance?

The graphic below aims to illustrate that the actual performance achieved using a D2D Backup System is dependent upon a number of factors including data set type, compression levels, number of data

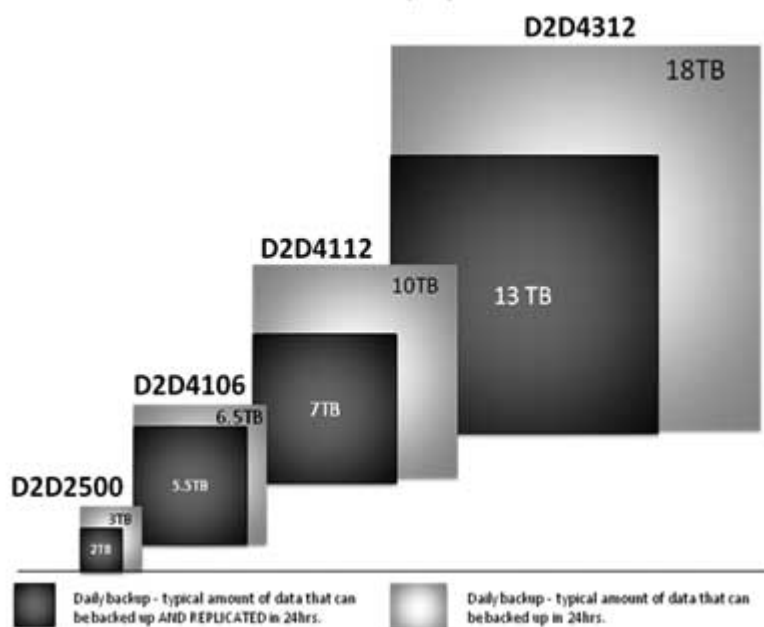


Features and Benefits

streams, number of devices emulated and number of concurrent tasks, such as backup and deduplication, housekeeping, and replication. In general, the more process steps, the longer it may take. Consequently, when compared to backup alone, a reduced amount of data will be backed up AND replicated by each D2D system within the same timeframe.

The illustration assumes a fully configured product, a compression ratio of 1.5, a data change rate of 1%, a data retention period of 6 months and a 10hr backup window. Each box in the diagram depicts how much data can be typically protected by each model of HP D2D Backup systems on a daily basis. It compares the difference between solely conducting backup with data deduplication, to performing backup and data deduplication with the addition of a data replication process.

Daily Backup – Typical amount of data that can be protected by D2D Backup systems.



Note also, that all forms of data deduplication can have a particular impact on tape offload performance, as data must be rehydrated before it is stored to tape. The D2D Backup System is designed to replace daily tape backup, leaving tape to play a part in cost-effective longer term archival or where data replication is not used for off-site disaster recovery. Continuing to off-load from the D2D device to tape on a daily basis can have a negative impact on performance.

For help with choosing the most appropriate D2D Backup Systems for your specific environment, we recommend you talk to your HP partner or sales advisor about using the StorageWorks Sizing Tool which can be downloaded from the Downloads section of www.hp.com/go/storageworks/sizer

Making use of the D2D's ability to run multiple backups in parallel can substantially improve aggregate throughput to a D2D appliance. This and a number of other best practices can help you to optimize the performance of a D2D Backup System. Please refer to: HP StorageWorks D2D Backup System, Best Practices for Performance Optimization which can be found at D2D Best Practices for Performance Optimization.

<http://h20000.www2.hp.com/bizsupport/TechSupport/DocumentIndex.jsp?lang=en&cc=us&taskId=101&prodClassId=-1&contentType=SupportManual&docIndexId=64180&prodTypeId=12169&>



Features and Benefits

prodSeriesId=3896393

For more information on achieving deduplication ratios go to: www.hp.com/go/deduplication

Data replication - network efficient disaster recovery

Data replication is the process of making a replica copy of a data set across a network to a "target site". It is generally used to transmit backup data sets off-site to provide disaster recovery (DR) protection in the event of catastrophic data loss at the "source site"

In the past, only the largest companies could afford to implement data replication as replicating large volumes of data backup over a typical WAN is expensive. However, today's D2D products with data deduplication have made it possible to replicate data over lower bandwidth links for a more cost-effective, network efficient replication solution that provides a practical disaster recovery solution for most sizes of business, in addition to an ideal solution for centralizing the backup of remote offices.

Data deduplication shrinks the amount of backup data that needs to be replicated from the source HP D2D appliance, and as a result significantly reduces replication bandwidth requirements. Once a replica of the data backup set has been created on a remote HP D2D target appliance, all that is required to keep the replica identical to the source is the automatic, periodic copying and movement of the new data segments which are created during each backup. With such small amounts of data being transmitted asynchronously, lower bandwidth networks offer sufficient performance and a much lower cost solution.

HP's data replication feature includes replication bandwidth limiting functionality, restricting the amount of bandwidth being used when replicating data for even more network-efficient replication. Without replication bandwidth limiting, a replication job could use as much bandwidth as is available, potentially making other network activities unresponsive. Replication bandwidth limiting is customer configurable at the appliance level via the graphical user interface and is set as a percentage of the available network bandwidth.

The following HP StorageWorks D2D Backup Systems are available with replication which may be licensed by target.

D2D2502i - a total of 4 source appliances can replicate to a single D2D2502i target

D2D2504i - a total of 8 source appliances can replicate to a single D2D2504i target

D2D4000 - a total of 16 source appliances can replicate to a single D2D4000 target

D2D4106 - a total of 16 source appliances can replicate to a single D2D4106 target

D2D4112 - a total of 24 source appliances can replicate to a single D2D4112 target

D2D4312 - a total of 50 source appliances can replicate to a single D2D4312 target

See the 'Related Options - Replication licenses' section of this document for ordering and fulfillment information for Replication licenses, Replication Manager and OST Plug-in.

Once a license has been obtained, configuring and using replication is made straightforward by the graphical user interface and configuration wizard on the HP D2D appliance.

D2D Replication Manager provides an easier way to manage a large number of devices being replicated to a central site.

Replication Manager software is available with the following replication licenses (EH991A, EH994A, EH984A, EH999A).



Features and Benefits

In order to benefit from Replication manager, D2D backup systems require the latest firmware, which can be obtained via a free firmware upgrade by following the "Support & Drivers" link on www.hp.com/go/d2d or by following the "HP Support & Drivers" link from: www.hp.com

With HP's OST plug-in installed on Media Servers, Symantec backup applications (i.e. Backup Exec or NetBackup) will have visibility to replicated copies of backups on remote D2D Backup Systems. This provides seamless integration into the backup administrator's workflow. Replicated copies are tracked by the backup application; content for both copies is maintained in the local backup domain's catalog. Replicated copies may be imported into the remote backup domain.

NOTE: Replication of data can occur between devices within the same product family i.e. between the HP StorageWorks D2D2500, D2D4000, D2D4112 and D2D4312 Backup Systems. However, replication is not supported outside this configuration. It is not possible to replicate data from the D2D2500 to the D2D100 Backup System, VLS product ranges nor to competitors' disk based backup systems with replication features.

Choosing the best backup target for data protection - VTL or NAS* While originally released as a virtual tape library, D2D Backup Systems are capable of supporting both VTL and NAS targets for backup applications on a single platform.

A virtual tape library (or VTL) is a disk-based solution which sits between your server and your physical tape drive/library to provide faster data backup, greater data availability and rapid restores. The D2D Backup Systems emulate both LTO tape autoloaders and libraries which are then recognized by the backup application as one or more physical tape devices. As compared to other disk-based data protection solutions, the advantages of using a virtual tape library are its ability to leverage and integrate into current tape backup environments, its ease of setup and management, and its minimal maintenance requirements.

When using the HP D2D Backup System as a NAS target, one or more file shares can be created on each system which are then used by the backup application as either CIFS targets for backup. Recognized and supported by a wide range of backup applications and integrated backup agents, using the D2D System as a NAS target provides a simple and cost-effective method to centralize and automate the backup of multiple servers in a non-tape environment.

The D2D Backup System will appear to the backup application as a NAS device. The D2D Backup System should not be used as a generic file-share device and will not perform optimally if used as such as it has been designed and optimized for performing backup and hence includes data deduplication and support for low-bandwidth replication.

* For legacy D2D backup systems (EJ001A, EJ002A, EH938A, EH939A, EH941A, EH942A, EH999A), the addition of NAS as a target for backup is limited to the CIFS protocol, suitable for use in Windows-only environments. Earliest legacy systems used authentication models for the CIFS protocol of "no authentication" or "local user level authentication". There was no support for Microsoft Active Directory authentication. However support for Microsoft Active Directory authentication is available on legacy systems via a free firmware upgrade by following the "Support & Drivers" link on www.hp.com/go/d2d or by following the "HP Support & Drivers" link from: www.hp.com EJ001B, EJ002B, EH999B, EH996A, EH998A and EH983A support CIFS, with Microsoft Active Directory authentication and NFS protocols.

The OST plug-in is built upon the NAS foundation. The first step is to configure CIFS shares on the D2D Backup Systems. Next, the plug-in is installed on the Media Servers. Instead of directing backups directly to CIFS shares on the D2D Backup Systems, the backup administrator configures the Media Servers to use the OST plug-in. More importantly, deduplicated replication may be tracked within the backup



Features and Benefits

application which maintains catalog information for both the local and the remote copies of backup images. Remote copies may be imported into the remote site's backup domain.

Differences between using a NAS or a VTL target for the HP D2D Backup System

For customers already familiar with or who plan to continue using tape automation in their backup environment, using VTL as a target for backup applications for the HP D2D Backup System can provide some key advantages including:

- Ensuring best backup performance.
- The ability to leverage tape automation licensing that may already be in use with your backup application.

Customers who are more familiar with using file systems, and for those customers who may be moving away from using tape backup, may find using the D2D Backup System as a NAS target provides a simpler way to configure their backup. Using the D2D System as a NAS target for backup can also provide some key advantages including:

- No need for additional backup application licensing as most mainstream backup application and integrated backup agents include support for backup to CIFS and NFS devices.
- No need for expertise in traditional backup methods as backup to a file share provides a simple method for backup.
- An easily adaptable backup methodology for remote offices where local tape backup will not be deployed and IT resources are limited.

While using the D2D Backup System as a NAS target for backup may provide a simple method for backup and recovery, there are a number of additional considerations one must be aware of when implementing this methodology including:

- i. There is a restriction on the number of backups each file share can accept concurrently. This varies based on the backup application being used and what data type is being backed up. Please refer to the HP D2D Backup Systems Best Practices Guide for additional details.
- ii. Deduplication will occur on any backup file that is greater than 24 MB. Backup applications may also create some small files during a backup job, these will not be deduplicated in order to ensure maximum performance and random access.
- iii. For offloading data to physical tape for archival or off-site storage, customers must use traditional copy methods via the backup application.
- iv. NAS targets on the D2D system are designed to be accessed for backup as such a file may only be accessed by a single user at a time - multiple users are not permitted to access the same file simultaneously.

There are significant differences between using a general NAS device and an HP D2D Backup System with a NAS target for backup applications.

The HP ProLiant Storage Server family of NAS appliances provide general disk file share and protection for Windows environments. The HP D2D Backup Systems have been specifically designed for backup and uniquely offer:

- Easier setup, maintenance and administration of backup
- Data deduplication functionality, allowing more backup data to be retained on disk for longer
- Low-bandwidth data replication for cost-effective off-site storage

The D2D backup Systems should not be used for general purpose NAS operations such as file sharing.



Features and Benefits

The HP D2D Backup System is designed for one particular usage model - as target storage device for backup applications. D2D Backup Systems include in-line data deduplication and support for low bandwidth replication (via a license) and is optimized for these features.

Offload to Tape

The D2D Backup Systems are an excellent solution for regular and daily backup with data deduplication allowing more data to be retained on disk for longer, and enabling network-efficient data replication to deliver a cost-effective off-site disaster recovery solution.

Using the D2D device should enable a significant reduction in the amount of data stored on physical tape, so that for example, there is no longer any need to store daily incremental backups on tape. However, HP still recommends periodic off-load to tape as the most cost-effective, energy efficient and robust solution for:

1. Long-term archival of data to meet regulatory requirements
2. Or off-site storage for disaster recovery where data replication is not an option

The frequency of off-load to tape will vary according to specific data protection requirements. Using a combination of both disk and tape can deliver all the benefits of disk for fast data backup and restore, and tape for additional levels of data protection, particularly over a period of multiple years.

When using the D2D Backup System as a VTL target for backup, there are three basic ways to periodically off-load data to tape using stand-alone tape drives, autoloaders or libraries

1. For highest performance, use a separate physical tape backup. This uses the backup application to create a completely separate tape backup from the server to a physical tape drive or library in parallel to the D2D backup. However, this will require the user to periodically manage two separate backup processes (D2D on a daily basis, and both D2D and Tape where archival is being prepared).
2. For a straight-forward and easier to manage solution, and where performance is less of an issue, use backup application copy. This uses the backup application to copy cartridges that have been backed up to the target D2D to a physical tape drive or library that is connected elsewhere in the storage network either directly connected to a media server or on a Fibre Channel SAN. This method may have a performance impact, as there are two stages in the backup; firstly write and deduplication using the D2D, followed by off-load of reduplicated data to tape.
3. Direct attach tape - this is a solution for applications where offload performance is not a critical factor. Directly offloading data to a physical tape drive** is available when using legacy D2D Backup Systems* with the HP D2D integrated tape export/import features to the following HP Ultrium tape drives using an appropriate host bus adapter:
 - HP External LTO-2, LTO-3, LTO-4 and LTO-5 Ultrium Tape Drives
 - HP Internal LTO-2, LTO-3, LTO-4 and LTO-5 Ultrium Tape Drives installed in either a HP 1U or 3U Rack-Mount Kit
 - HP StorageWorks 1/8 G2 Tape Autoloader
 - HP StorageWorks MSL2024, MSL4048 and MSL8096 Tape Libraries

* Legacy D2D backup systems include (EH993A, EH938A, EH939A, EH941A, EH942A, EJ001A, EJ002A)

** Up to 4 SAS tape drives (either standalone or in libraries) or 2 pSCSI tape drives (either standalone or in libraries)

This method is not recommended as it has the greatest performance and manageability impact.



Features and Benefits

recommended method is to use the backup application to control and manage the copy of virtual to physical media or run parallel backups to physical media.

HP LeftHand SAN Solutions - creating an end-to-end IP SAN storage solution with HP D2D Backup Systems

HP LeftHand P4000 SAN Solutions deliver enterprise functionality that enhances virtual environments, simplifies management, and reduces costs. Easy to deploy, scale and maintain, HP P4000 SAN Solutions ensure that crucial business data remains available. This innovative approach to storage provides unique double fault protection across the entire SAN, reducing vulnerability without driving up costs the way traditional SANs can.

When combined with HP D2D Backup Solutions, users can create an affordable end-to-end IP SAN storage solution that is both easy to implement and easy to maintain. From entry-level solutions for a remote or branch office to mid-range solutions that scale for multiple sites, HP D2D Backup Systems provide the optimal balance of affordability, manageability, and reliability to handle the data protection needs of your HP P4000 SAN solution.

Models

For help with choosing the most appropriate D2D Backup Systems for your specific environment, we recommend you talk to your HP partner or sales advisor about using the StorageWorks Sizing Tool which can be downloaded from the Downloads section of www.hp.com/go/storageworks/sizer

HP StorageWorks D2D4312 Backup System

Backup System for 'enterprise data centers' the D2D4312 delivers a scalable 4U solution from 9 to 36 TB of usable capacity and speeds of up to 2.4TB/hour*. The highest capacity and performance point in the HP D2D Backup System family. These devices automate the daily backup of multiple distributed servers through the flexibility of virtual tape library and NAS targets for backup applications.

*Actual performance is dependent upon data set type, compression levels, number of data streams, number of devices emulated and number of concurrent tasks, such as housekeeping or replication.

HP StorageWorks D2D4112 Backup System

Backup system for mid sized data centers and as a replication target device for remote and branch offices, the 2U D2D4112 series delivers a scalable solution from 9 to 18 TB of useable capacity using a simple and cost effective 2U capacity upgrade and speeds of up to 1.3TB/hour*. These devices automate the daily backup of multiple distributed servers through the flexibility of virtual tape library and NAS targets for backup applications.

*Actual performance is dependent upon data set type, compression levels, number of data streams, number of devices emulated and number of concurrent tasks, such as housekeeping or replication.

HP StorageWorks D2D4106 Backup System

Backup System for 'remote or branch offices and smaller data centers', the 2U D2D4106 Backup system delivers a scalable solution from 3 to 9 TB of usable capacity using a simple and cost effective 2U capacity upgrade and speeds of up to 800GB/hour*.

These devices automate the daily backup of multiple distributed servers through the flexibility of virtual tape library and NAS targets for backup applications.

*Actual performance is dependent upon data set type, compression levels, number of data streams, number of devices emulated and number of concurrent tasks, such as housekeeping or replication.

HP StorageWorks D2D4004 or D2D4009

Backup system for larger remote or branch offices and smaller data centers, the 2U D2D4000 series delivers a scalable solution from 3 to 7.5 TB of useable capacity using a simple and cost effective



Features and Benefits

Backup System

capacity upgrade and with speeds of up to 325GB/hour*. These devices automate the daily backup of multiple distributed servers through the flexibility of virtual tape library and NAS** targets for backup applications.

*Actual performance is dependent upon data set type, compression levels, number of data streams, number of devices emulated and number of concurrent tasks, such as housekeeping or replication.

** For legacy D2D backup systems (EJ001A, EJ002A, EH938A, EH939A, EH941A, EH942A, EH999A), the addition of NAS as a target for backup is limited to the CIFS protocol, suitable for use in Windows-only environments. Earliest legacy systems used authentication models for the CIFS protocol of "no authentication" or "local user level authentication". There was no support for Microsoft Active Directory authentication. However support for Microsoft Active Directory authentication is available on legacy systems via a free firmware upgrade by following the "Support & Drivers" link on www.hp.com/go/d2d or by following the "HP Support & Drivers" link from: www.hp.com EJ001B, EJ002B, EH999B, EH996A, EH998A and EH983A support CIFS, with Microsoft Active Directory authentication and NFS protocols.

HP StorageWorks

D2D2502i, or D2D2504i Backup System

Backup system for remote or branch offices and smaller data centers, the entry level 1U D2D2500 series offers a choice of 1.5 and 3 TB useable capacity and speeds of up to 450GB/hour*. These devices automate the daily backup of multiple distributed servers through the flexibility of Virtual tape library and NAS (targets for backup applications).

*Actual performance is dependent upon data set type, compression levels, number of data streams, number of devices emulated and number of concurrent tasks, such as housekeeping or replication.



Compatibility

HP extensive compatibility testing program assures that your HP StorageWorks D2D Backup Systems work with leading servers, operating systems, and backup applications, including those not manufactured by HP.

Server Compatibility

The HP D2D Backup Systems are supported on servers that use Microsoft Windows or Linux operating systems, including HP ProLiant, HP Integrity Servers and a variety of third-party servers.

For compatibility details on specific servers, refer to our website for the latest hardware compatibility information: <http://www.hp.com/go/connect> for D2D2500 D2D4000 and D2D4106 or <http://www.hp.com/go/ebs> for D2D4000 D2D4112 for D2D4000, D2D4112 and 4312.

OS Support

The HP D2D Backup Systems are supported with Microsoft Windows, Linux, HP-UX and Solaris operating systems.

For more details, refer to our website for the latest information: <http://www.hp.com/go/connect> for D2D2500 D2D4000 and D2D4106 or <http://www.hp.com/go/ebs> for D2D4000 D2D4112 and 4312.

Software Support

The HP D2D Backup Systems are supported by a range of popular backup applications, including HP Data Protector software.

For details of specific backup application compatibility, refer to our website for the latest information: <http://www.hp.com/go/connect> for D2D2500 D2D4000 and D2D4106 or <http://www.hp.com/go/ebs> for D2D4000 D2D4112 and 4312.

Tape drive compatibility

Legacy HP D2D Backup Systems* support direct connection of the following HP LTO Ultrium tape drives, tape autoloaders and tape libraries using an appropriate host bus adapter:

- HP External LTO-2, LTO-3, LTO-4 and LTO-5 Ultrium tape drives
- HP Internal LTO-2, LTO-3, LTO-4 and LTO-5 Ultrium tape drives in either an HP 1U or 3U Rack-mount Kit
- HP External 1/8 G2 Autoloader with LTO-2, LTO-3, LTO-4 and LTO-5 Ultrium tape drives
- HP External MSL2024 Tape Library with LTO-2, LTO-3, LTO-4 and LTO-5 Ultrium tape drives
- HP External MSL4048 Tape Library with LTO-2, LTO-3, LTO-4 and LTO-5 Ultrium tape drives

However, direct tape offload is not recommended on legacy systems*, as it has a significant impact on management and performance. The recommendation is to use the backup application to control and manage the copy of virtual to physical media or run parallel backups to physical media.

* Legacy D2D backup systems include (EH993A, EH938A, EH939A, EH941A, EH942A, EJ001A, EJ002A)

NOTE: When using the D2D Backup System as a NAS target for backup, direct offload to physical tape is not supported.

Backup to tape autoloaders and tape libraries is also available across the network, using the tape-to-tape (or media copy) feature in your backup. For further information about these products, visit the HP Web site at: www.hp.com/go/tape

Network Compatibility

For the best performance, the HP D2D Backup Systems should be connected to the servers it protects via a 1Gb or 10Gb (gigabit) Ethernet network, dependent on product. It is supported on all 1Gb or 10Gb Ethernet network interface cards (NICs) and switches, dependent on product. The devices will run on



Compatibility

either IPv4 or IPv6 networks.

The HP D2D Backup Systems are also supported on 100 base-T Ethernet networks, but performance will be severely restricted. This product is not supported on networks using slower Ethernet technology. When using Virtual tape devices the D2D Backup Systems can communicate data over your Ethernet network using iSCSI technology:

- For Windows systems, this requires installation of the Microsoft iSCSI Initiator 2.02 (or above) software driver on each server that will be backed up to the HP D2D Backup System. This initiator is downloaded and installed from Microsoft automatically by the installation wizard and is also available via free download from the Microsoft website at: <http://www.microsoft.com>
- For supported Linux operating systems, a software iSCSI initiator is provided with the operating system but may need to be installed separately if not included in the initial operating system installation.

SAN Compatibility

The HP D2D Backup Systems support a variety of Fibre Channel switches and HBAs.

For more details of SAN compatibility, refer to our website for the latest information:
<http://www.hp.com/go/ebs>

Additionally, HP D2D backup Systems are compatible with HP's new portfolio of HP LeftHand P4000 SAN Solutions. For more information on HP LeftHand SAN Solutions, visit the HP website at:
<http://www.hp.com/go/lefthandnetworks>



Service and Support, HP Care Pack, and Warranty Information

Warranty and Services Included with the Product Hewlett-Packard provides a 1 year parts exchange, 1 year labor, 1 year on site, normal business hours, next business day response for HP StorageWorks D2D4004, D2D4009 and D2D4112 Backup Systems, plus 9x5 phone support for the duration of the warranty.

The StorageWorks D2D2500 includes a 1-year, next-day, parts exchange, limited warranty for the HP plus 9x5 phone support for the duration of the warranty.

Where a Tape Drive is attached to a D2D Backup System, the tape drive carries its own separate warranty. Hewlett-Packard provides a 3-year, next-day, parts exchange, limited warranty for the HP StorageWorks Ultrium tape drive, plus 9x5 phone support for the duration of the warranty.

For more information about HP's Global Limited Warranty and Technical Support, visit:
<ftp://ftp.compaq.com/pub/products/storageworks/warranty/321708-408.pdf>

For increased uptime, productivity and ROI -HP Care Pack packaged services for Storage

These days, you need to get the most out of your storage investment-you can't afford not to. When you buy HP storage products and solutions, it's also a good time to think about what levels of service and support you may need. To help take the worry out of deploying, designing, maintaining, and managing your environment, we've designed a portfolio of service options that are as flexible, reliable and scalable as your storage. Unlike storage-only vendors, we take a holistic approach to your entire environment, bridging storage, servers, blades, software and network infrastructures with our HP Care Pack packaged services for Storage.

Protect your business beyond the warranty

When it comes to robustness and reliability, standard warranties on today's computing equipment have matured just as the technologies have matured. Good news on some fronts-but also a source of potential problems and subsequent consequences that come from depending on standard warranties alone. Standard warranty protects against product defects and some causes of downtime- but not the business. By using a standard approach to warranty uplifts, such as HP Care Pack Services, you can reduce downtime risks and be more certain of operational consistency for both mission-critical and standard business computing. Simply put, HP Care Pack Services normalize the warranty of combined products - helping you proactively guard against unplanned downtime.

Extending warranties with HP Care Pack Services

For cost-effective upgrading or extending your standard warranty, HP Care Pack Services offer a suite of standard reactive hardware and software support services that are sold separately, or combined as with our Support Plus and Support Plus 24 services. The portfolio also provides a combination of proactive and reactive services, such as Proactive 24 Service and Critical Service. In addition, with HP Proactive Select we offer an innovative approach to service delivery that gives you the flexibility to acquire the specific proactive services you need today, then add services as your needs evolve. HP Proactive Select offers a broad set of technical or per-event type service options - including server, storage, and network, SAN device, and software, environment, installation and education services. Services that you can mix and match depending on your specific requirements, from preliminary planning and equipment delivery to installation, configuration, integration, and testing, through every level of ongoing support. Our HP Care Pack packaged services for Storage assures help when you need it most. And for many products, post-warranty HP Care Pack Services are available when your original warranty has expired.

HP Storage Services: Offering reliability, flexibility and value-just like your storage

HP Storage Services offers a full spectrum of customer care, from technology support to complex migrations to complete completely managed services. HP Factory Express provides customization, integration and deployment services for turnkey solutions. HP Education offers flexible, comprehensive training on storage networking, disk storage systems, and storage software to help your IT staff get the most out of your investments. And HP Financial solutions extend innovative financing and asset management programs to cost-effective buy, manage and eventually retire your older equipment.

HP Storage Services, the trusted business technology experts who manage your technology in action, because when technology



Service and Support, HP Care Pack, and Warranty Information

works, business works. <http://www.hp.com/hps/storage>

NOTE: Care Pack Services availability may vary by product and country.

HP Care Pack Services are sold by HP and HP Authorized Service Partners:

- Services for customers purchasing from HP or an enterprise reseller are quoted using HP order configuration tools.
- Customers purchasing from a commercial reseller can find HP Care Pack Services at:
<http://www.hp.com/go/lookuptool>

Recommended HP Care Pack Services for optimal satisfaction with your HP product.

Recommended Services 3-Year HP Support Plus 24

For a higher return on your storage investment, HP Support Plus 24 provides integrated hardware and software support services designed specifically for your technology. Available 24x7, this 3-year combined reactive support option delivers onsite hardware support and over-the-phone software support around-the-clock. Leverage the full strength of HP Technology Services - customers can trust the services professionals at HP to work collaboratively with them, putting our strategic and technical know-how to work across their entire infrastructure.

- Improve uptime with responsive hardware and software services
- Enjoy consistent service coverage across geographically dispersed sites
- Update HP software at a predictable cost
- Increase customer satisfaction-with no interoperability gaps

<http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-6638EN.pdf>

HP Installation and Startup Service for D2D Backup System

Complementing your new HP StorageWorks D2D Backup System, the HP Installation and Startup Service provides the necessary activities required to deploy your D2D Backup System. The service includes planning, deployment, installation verification tests (IVT) and a customer orientation session.

- Allows your IT resources to stay focused on their core tasks and priorities
- Reduces implementation time, impact and risk to your storage environment
- Helps you effectively utilize HP product by knowledge gained during onsite delivery of the service

<http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA2-9557ENW.pdf>

HP Backup and Recovery Solution Service

Rapid recovery from system downtime can hinge on the efficiency of your backup and recovery management environment - and on how well that environment is integrated with your storage infrastructure. But integration processes can be time-consuming and complex, and your IT resources are already stretched thin. Where can you find the expert help you need?

For fast, effective integration of your backup solution into an existing or new storage infrastructure, turn to the storage experts at HP Services. Our Backup and Recovery Solution Service (BRSS) provides end-to-end management of your backup integration process. The BRSS team works with you to analyze your business and IT environment; develop a comprehensive integration plan and timetable; design an



Service and Support, HP Care Pack, and Warranty Information

architecture that suits your critical requirements; install backup software; implement your solution; and validate your configuration.

- By engaging HP to implement HP Data Protector, customers' IT staff can stay focused on their core tasks and priorities, resulting in less impact to your business
- Professional backup and recovery planning that aligns with customer's business needs and implementation that reduces project execution time and risk to the storage environment
- HP's expertise with backup and recovery helps ensure issues are avoided

<http://h20195.www2.hp.com/V2/GetPDF.aspx/5982-7442EN.pdf>

Optional HP Care Pack Services that will enhance your HP product experience.

Optional Services 5-Year HP Support Plus 24

As an alternative to our recommended support level, for customers who need to improve uptime with responsive 24x7 product support:

HP Support Plus 24 helps you increase performance and availability with comprehensive, consistent hardware and software services. Working with your IT team, HP Services engineers deliver onsite hardware support and over-the-phone software support around-the-clock 365 days per year. Service coverage encompasses HP products and selected multivendor hardware and software.

In addition, this convenient HP Care Pack packaged service makes software updates available to you at substantial savings.

Choose Support Plus 24 when you need to:

- Improve uptime with responsive hardware and software services available anytime
- Cost-effectively obtain expert 24x7 multivendor hardware and software support
- Enjoy consistent service coverage across geographically dispersed sites
- Update HP and selected third-party software at a predictable cost
- Take advantage of subscription savings on software updates

<http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-6638EN.pdf>



Service and Support, HP Care Pack, and Warranty Information

eSupport

HP eSupport is a portfolio of technology-based services that assist you with managing your business environment - from the desktop to the data center.

Support Portal

The HP support portal provides one-stop access to the information, tools and services you need to manage the daily operations of your IT environment.

Features include:

- Access to self-solve tools (including search technical knowledge base)
- Efficient logging and tracking of support cases
- Collaboration with other business and IT professionals
- Download of patches and drivers
- Access to diagnostic tools
- Proactive notification of relevant information

Access to certain features of the support portal requires an HP service agreement. To access the support portal, visit: <http://www.hp.com/support>

Customer Technical Training

Consider education as an integral part of your strategy to get the best return on investment for your HP storage solution. HP offers a variety of training courses on storage software, networking, archiving and disk storage systems. Our classes are available in many delivery modalities from traditional instructor-led courses at one of our 80 training centers worldwide to on-site training customized to your needs or online. www.hp.com/learn/storage

HP Services Awards

HP Services continues to be recognized for service and support excellence by customers, partners, industry organizations and publications around the world. Recent honors and award reflect our services team's dedications, technical expertise, professionalism and uncompromising commitment to customer satisfaction. For a list of all our awards, please visit:

<http://h20219.www2.hp.com/services/cache/433028-0-0-225-121.htm>

Additional Services Information

For more information about HP Care Pack Services for Storage, please visit:

<http://www.hp.com/hps/storage>

If you have specific questions, contact your local HP representative. Contact information for a representative in your area can be found at "Contact HP" <http://www.hp.com>



Configuration Information

Step 1 - Select a Configuration

Select one:

Model Name	Model Description	Part Number
HP StorageWorks D2D4312 Backup System	D2D4312 Backup System with 12 TB of disk storage Kit Contents: D2D4312 Backup System (12 x 1 TB disks) Ethernet cable(Cat 5e) 3m (x2) 2 x Power cords (with IEC 320 C13 plug for Rack PDU) Installation poster HP StorageWorks D2D4312 Backup System CD (contains installation wizard, device drivers, and documentation, all localized in multiple languages)	EH983A
HP StorageWorks D2D4112 Backup System	D2D4112 Backup System with 12 TB of disk storage Kit Contents: D2D4112 Backup System (12 x 1 TB disks) Ethernet cable(Cat 5e) 3m (x2) 2 x Power cords (with IEC 320 C13 plug for Rack PDU) Installation poster HP StorageWorks D2D4112 Backup System CD (contains installation wizard, device drivers, and documentation, all localized in multiple languages)	EH993B
HP StorageWorks D2D4112/4312 Backup System Capacity Upgrade Kit	D2D4112 Backup System upgrade kit, MSA60 base enclosure offering additional 12 TB of disk storage Kit Contents: HP StorageWorks 60 Modular Storage Array with 12 x 1TB discs MSA60 base enclosure with redundant power supplies and fan modules Rack-mounting hardware kit 0.5m mini-SAS cable Two AC power cords and two PDU interconnect cords Entitlement certificate Installation instructions	EH995A
HP StorageWorks D2D4004i Backup System	D2D4004i Backup System with 4.5 TB of disk storage Kit Contents: D2D4004i Backup System (6 x 750 GB disks) Ethernet cable(Cat 5e) 3m (x2) 2 x Power cords (with IEC 320 C13 plug for Rack PDU) Installation poster HP StorageWorks D2D4000 Backup System CD (contains installation wizard, device drivers, and documentation, all localized in multiple languages)	EH938A
HP StorageWorks D2D4106i Backup System	D2D4106i Backup System with 6 TB of disk storage Kit Contents: D2D4106i Backup System (12 x 500 GB disks) Ethernet cable(Cat 5e) 3m (x2) 2 x Power cords (with IEC 320 C13 plug for Rack PDU)	EH996A



Configuration Information

Installation poster
HP StorageWorks D2D4000 Backup System CD (contains installation wizard, device drivers, and documentation, all localized in multiple languages)

HP StorageWorks D2D4106fc Backup System

D2D4106fc Backup System with 6 TB of disk storage

EH998A

Kit Contents:

D2D4106fc Backup System (12 x 500 GB disks)
Ethernet cable(Cat 5e) 3m (x2)
2 x Power cords (with IEC 320 C13 plug for Rack PDU)
Installation poster
HP StorageWorks D2D4000 Backup System CD (contains installation wizard, device drivers, and documentation, all localized in multiple languages)

HP StorageWorks D2D4009i Backup System

D2D4009i Backup System with 9 TB of disk storage

EH939A

Kit Contents:

D2D4009i Backup System (12 x 750 GB disks)
Ethernet cable(Cat 5e) 3m (x2)
2 x Power cords (with IEC 320 C13 plug for Rack PDU)
Installation poster
HP StorageWorks D2D4000 Backup System CD (contains installation wizard, device drivers, and documentation, all localized in multiple languages)

HP StorageWorks D2D4004fc Backup System

D2D4004fc Backup System with 4.5 TB of disk storage

EH941A

Kit Contents:

D2D4004fc Backup System (6 x 750 GB disks)
Ethernet cable(Cat 5e) 3m (x2)
2 x Power cords (with IEC 320 C13 plug for Rack PDU)
Installation poster
HP StorageWorks D2D4000 Backup System CD (contains installation wizard, device drivers, and documentation, all localized in multiple languages)

HP StorageWorks D2D4009fc Backup System

D2D4009fc Backup System with 9 TB of disk storage

EH942A

Kit Contents:

D2D4009fc Backup System (12 x 750 GB disks)
Ethernet cable(Cat 5e) 3m (x2)
2 x Power cords (with IEC 320 C13 plug for Rack PDU)
Installation poster
HP StorageWorks D2D4000 Backup System CD (contains installation wizard, device drivers, and documentation, all localized in multiple languages)

HP StorageWorks D2D4904 Capacity Upgrade

D2D4904 Capacity Upgrade, enables the D2D4004 products to be upgraded to D2D4009 capacity product

EH944A

Kit Contents:

6 x 750 GB discs
Entitlement certificate
Installation booklet



Configuration Information

HP StorageWorks D2D4106 Capacity Upgrade	D2D4106i Capacity Upgrade, enables the D2D4106 products to be upgraded to a 12TB (raw) capacity product Kit Contents: 12 x 500 GB discs Entitlement certificate Installation booklet	EH997A
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HP StorageWorks D2D2504i Backup System	D2D2504i Backup System with 4 TB of disk storage Kit Contents: D2D2504i Backup System 4x 1 TB Hot swap hard drives Ethernet cable(Cat 5e) 3m (x2) Power cable (IEC 320 C13 Connector for Rack PDU) Installation poster HP StorageWorks D2D2500 Backup System CD(contains installation wizard, device drivers, and documentation, all localized in multiple languages)	EJ002B
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HP StorageWorks D2D2502i Backup System	D2D2502i Backup System with 2 TB of disk storage Kit Contents: D2D2502i Backup System (4 x 500 GB hard disk drives) Ethernet cable(Cat 5e) 3m (x2) Power cable (IEC 320 C13 Connector for Rack PDU) Installation poster HP StorageWorks D2D2500 Backup System CD (contains installation wizard, device drivers, and documentation, all localized in multiple languages)	EJ001B
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NOTE: D2D2500 units may be installed outside of a rack but this is not recommended by HP. If installed outside of a rack, the D2D2500 unit should be kept in a horizontal fashion, on a flat surface, at a location where there is no obstruction in the front and back of the system for free air flow at the right temperature, and without any other system or weight stacked on top of the system. In addition, the D2D2500 ships standard with a power cord to connect to a PDU inside of a rack. If the unit needs to be powered using a 110V receptacle (NEMA-15), the NEMA power cord (227099-001) must be ordered separately. If the unit requires a local power cord, please check the power cord matrix at: <http://www.hp.com/go/powercordmatrix> for the appropriate cord.

HP strongly recommends that D2D2500 units be installed inside a rack to ensure the unit operates in normal operating parameters as defined in the Technical Specifications section of this document.

Step 2- Related Options

Replication Licenses	HP StorageWorks D2D4312 Replication License	EH984A
	HP StorageWorks D2D4112 Replication License	EH994A
	HP StorageWorks D2D4106 Replication License	EH999A
	HP StorageWorks D2D4000 Replication License	EH991A
	HP StorageWorks D2D2500 Replication License	EH990A



Configuration Information

- These licenses enable an appliance to host replication target libraries. (No license is required for appliances which only act as replication sources)
- Licensing is "per appliance" i.e. A single license is required to enable an appliance to host as many replication target libraries as it is capable of
- Licenses are delivered via www.webware.hp.com and are node-locked by appliance serial number (and are not transferable)
- Licenses also include an account providing authorization to download the HP D2D Replication Manager software which provides an easier way to manage a large number of devices being replicated across numerous sites.
- Download instructions of the D2D Replication Manager are included when the replication license is downloaded
- This account also provides authorization to download the HP OST Plug-in which enables NetBackup and Backup Exec to manage deduplicated replication between D2D appliances. Two replication licenses are required to use the OST Plug-in. The need is clear when deploying an active-active replication configuration, since both D2D appliances are targets for each other. Two replication licenses are also required when deploying an active-passive replication configuration. With this configuration a replication license is also needed on the source D2D appliance to support OST restores from the target D2D appliance.
- Total number of source appliances that can replicate into a single target appliance is as follows:
 - D2D4312 target supports up to 50 source D2D appliances
 - D2D4112 target supports up to 24 source D2D appliances
 - D2D4106i target supports up to 24 source D2D appliances
 - D2D4106fc target supports up to 24 source D2D appliances
 - D2D4004/D2D4009i/fc target supports up to 16 source D2D appliances
 - D2D2504i target supports up to 8 source D2D appliances
 - D2D2502i target supports up to 4 source D2D appliances

NOTE: Replication Manager software is available with the following replication licenses (EH991A, EH994A, EH984A, EH999A). In order to benefit from Replication manager, D2D backup systems require the latest firmware, which can be obtained via a free firmware upgrade by following the "Support & Drivers" link on www.hp.com/go/d2d or by following the "HP Support & Drivers" link from: www.hp.com

Direct Attach Cable	HP 0.5m SFP+ 10GbE Copper Cable	487649-B21
	HP 1m SFP+ 10GbE Copper Cable	487652-B21
	HP 3m SFP+ 10GbE Copper Cable	487655-B21
	HP 5m SFP+ 10GbE Copper Cable	537963-B21
	HP 7m SFP+ 10GbE Copper Cable	487658-B21

NOTE: Direct Attach Cable (DAC) must be purchased separately for copper environments.

Fiber Optic Modules	HP BLc 10Gb SR SFP+	455883-B21
	HP BLc10Gb LR SFP+	455886-B21
	HP BLc 10Gb LRM SPF+	455889-B21

NOTE: Fiber transceivers and cables must be purchased separately for fiber-optic environments.



Configuration Information

Fiber Optic Cables	HP 2m SW LC/SC FC Cable Kit	221691-B21
	HP 5m SW LC/SC FC Cable Kit	221691-B22
	HP 15m SW LC/SC FC Cable Kit	221691-B23
	HP 2m SW LC/LC FC Cable Kit	221692-B21
	HP 5m SW LC/LC FC Cable Kit	221692-B22
	HP 15m SW LC/LC FC Cable Kit	221692-B23
	HP 30 m LC-LC Multi-Mode OM2 Fiber Optic Cable	221692-B26
	HP 50 m LC-LC Multi-Mode OM2 Fiber Optic Cable	221692-B27
	HP .5 m LC-LC Multi-Mode OM3 Fiber Optic Cable	AJ833A
	HP 1 m LC-LC Multi-Mode OM3 Fiber Optic Cable	AJ834A
	HP 2 m LC-LC Multi-Mode OM3 Fiber Optic Cable	AJ835A
	HP 5 m LC-LC Multi-Mode OM3 Fiber Optic Cable	AJ836A
	HP 15 m LC-LC Multi-Mode OM3 Fiber Optic Cable	AJ837A
	HP 30 m LC-LC Multi-Mode OM3 Fiber Optic Cable	AJ838A
	HP 50 m LC-LC Multi-Mode OM3 Fiber Optic Cable	AJ839A

NOTE: Fiber transceivers and cables must be purchased separately for fiber-optic environments.

NOTE: For additional information on 10Gb cable specifications go to: http://www.hewlett-packard.com/rnd/pdfs/10gig_cabling_technical_brief.pdf

Rack-mount Options **Rack-mount Tape Drive Kits**

NOTE: Connecting a tape drive option to the D2D Backup Systems requires installation of the appropriate host bus adapter. Please select an option from the list provided below.

HP StorageWorks 1U SCSI Rack-mount Kit	A7445B
HP Storage Works 1U SAS Rack-mount Kit	AE459B
HP StorageWorks 3U SCSI Rack-mount Kit	274338-B22
HP StorageWorks 3U SAS Rack-mount Kit	AG576B

Pre-Configured Rack-mount Tape Options

NOTE: Connecting a tape drive option to the D2D Backup Systems requires installation of the appropriate host bus adapter. HP SC11Xe SCSI HBA (412911-B21) recommended for SCSI and HP SC44Ge SAS HBA (416096-B21) recommended for SAS.

HP StorageWorks 1U Rack-mount Kit with one LTO-2 Ultrium 448 SCSI Tape Drive	DW028B
HP StorageWorks 1U Rack-mount Kit with one LTO-3 Ultrium 920 SCSI Tape Drive	EH903A
HP StorageWorks 1U SAS Rack-Mount Kit with one LTO-4 Ultrium 1760 SAS drive	EH946B
HP StorageWorks 1U SAS Rack-mount Kit with one LTO-5 Ultrium 3000 SAS drive	EJ014A
HP StorageWorks 3U Rack-mount Kit with one LTO-3 Ultrium 960 SCSI Tape Drive	Q1595B
HP StorageWorks 3U Rack-mount Kit with one LTO-4 Ultrium 1760 SAS Tape Drive	EH946A
HP StorageWorks 3U Rack-mount Kit with one LTO-4 Ultrium 1840 SCSI Tape Drive	EH926A
HP StorageWorks 3U Rack-mount Kit with one LTO-5 Ultrium 3280 SAS Tape Drive	EJ013A

Internal Tape Drive Options for Rack-mount Kits



Configuration Information

NOTE: Connecting a tape drive option to the D2D Backup Systems requires installation of the appropriate host bus adapter. HP SC11Xe SCSI HBA (412911-B21) recommended for SCSI and HP SC44Ge SAS HBA (416096-B21) recommended for SAS.

HP StorageWorks LTO-2 Ultrium 448 SCSI Internal Tape Drive	DW016A
HP StorageWorks LTO-2 Ultrium 448 SAS Internal Tape Drive	DW085A
HP StorageWorks LTO-3 Ultrium 920 SCSI Internal Tape Drive	EH903A
HP StorageWorks LTO-3 Ultrium 920 SAS Internal Tape Drive	EH847A
HP StorageWorks LTO-3 Ultrium 960 SCSI Internal Tape Drive	Q1538A
HP StorageWorks LTO-4 Ultrium 1760 SAS Internal Tape Drive	EH919A
HP StorageWorks LTO-4 Ultrium 1840 SCSI Internal Tape Drive	EH853A
HP StorageWorks LTO-4 Ultrium 1840 SAS Internal Tape Drive	EH860A
HP StorageWorks LTO-5 Ultrium 3000 SAS Internal Tape Drive	EH957A
HP StorageWorks LTO-5 Ultrium 3280 SAS Internal Tape Drive	EH899A

NOTE: HP Rack-mount kits can support a maximum of either 2 half-height (1U) or 4 half-height or 2 full-height (3U) tape drives. While the HP D2D can only attach to a single tape drives or libraries, you may add additional tape drives to the kit to allow for connection to other devices in your rack.

Tape Drive Options

(Connecting a tape drive option to the D2D Backup Systems requires installation of the appropriate host bus adapter. HP SC11Xe SCSI HBA (412911-B21) recommended for SCSI and HP SC44Ge SAS HBA (416096-B21) recommended for SAS.) D2D4312 requires Fibre Channel HBA supplied))

Direct attach

HP StorageWorks LTO-5 Ultrium 3280 SAS External Tape Drive	EH900A
HP StorageWorks LTO-5 Ultrium 3000 SAS External Tape Drive	EH958A
HP StorageWorks LTO-4 Ultrium 1840 SCSI External Tape Drive	EH854A
HP StorageWorks LTO-4 Ultrium 1840 SAS External Tape Drive	EH861A
HP StorageWorks LTO-4 Ultrium 1760 SAS External Tape Drive	EH920A
HP StorageWorks LTO-3 Ultrium 960 SCSI External Tape Drive	Q1539B
HP StorageWorks LTO-3 Ultrium 920 SCSI External Tape Drive	EH842A
HP StorageWorks LTO-3 Ultrium 920 SAS External Tape Drive	EH848A
HP StorageWorks LTO-2 Ultrium 448 SCSI External Tape Drive	DW017B
HP StorageWorks LTO-2 Ultrium 448 SAS External Tape Drive	DW086A

HP StorageWorks 1/8 G2 Tape Autoloader
http://h18000.www1.hp.com/products/quickspecs/12630_na/12630_na.html

HP StorageWorks MSL2024 Tape Library

HP StorageWorks MSL4048 Tape Library

http://h18000.www1.hp.com/products/quickspecs/13258_na/13258_na.html

NOTE: HP StorageWorks Tape Autoloaders and Tape Libraries listed above are available with a wide range of LTO Ultrium tape drive and interface options. Please refer to the Tape Autoloader and Tape Library product specific QuickSpecs for detailed ordering information. www.hp.com/go/automation

NOTE: Direct tape offload is only available on legacy systems* and is not supported with NAS targets. The recommended method of tape offload for virtual tape is to use the backup application to control and manage the copy of virtual to physical media.

* Legacy D2D backup systems include (EH993A, EH938A, EH939A, EH941A, EH942A, EJ001A, EJ002A)



Configuration Information

Host Bus Adapter	HP SC11Xe Host Bus Adapter (SCSI)	412911-B21
(HBA) Options	HP SC44Ge Host Bus Adapter (SAS)	416096-B21



QuickSpecs

HP StorageWorks D2D Backup Systems

Technical Specifications

	D2D2502i	D2D2504i	D2D4004i /fc	D2D4106i /fc	D2D4009i /fc	D2D4112	D2D4312
Form Factor	1U Rack	1U Rack	2U Rack	2U scalable rack	2U Rack	2U scalable rack	4U scalable rack
Total Capacity (Raw)	2 TB	4 TB	4.5 TB	Up to 12 TB**	9 TB	Up to 24 TB**	Up to 48 TB**
Total Capacity (Useable)	1.5 TB	3 TB	3 TB	Up to 9 TB**	7.5 TB	Up to 18 TB**	Up to 36 TB**
Data Deduplication Usable capacity using data deduplication at 20:1*	30 TB	60 TB	60 TB	180 TB	150 TB	360 TB	720 TB
Replication	<p>Supports data replication between D2D appliances. Replication is automatic and appliances may function as both replication targets and sources simultaneously with a license only being required for any appliance acting as a target. Replication Manager provides an easier way to manage a large number of devices being replicated across numerous sites and is included with the license. HP's OST plug-in integrates de-duplicated replication with Symantec backup applications and is also included with the replication license.</p> <p>Replication Manager software is available with the following replication licenses (EH991A, EH994A, EH984A, EH999A). In order to benefit from Replication manger, D2D backup systems require the latest firmware, which can be obtained via a free firmware upgrade by following the "Support & Drivers" link on www.hp.com/go/d2d or by following the "HP Support & Drivers" link from: www.hp.com</p>						
Targets for backup applications	<p>Virtual tape library and NAS</p> <p>NOTE: For legacy D2D backup systems (EJ001A, EJ002A, EH938A, EH939A, EH941A, EH942A, EH999A), the addition of NAS as a target for backup is limited to the CIFS protocol, suitable for use in Windows-only environments. However EJ001B, EJ002B, EH999B, EH996A, EH998A and EH983A support CIFS and NFS protocols.</p>						
Maximum number of source appliances per target appliance (fan in)	4	8	16	24	16	24	50
Disk Drive Capacity, Type	500 GB, SATA 7200rpm, 3.5 inch	1 TB, SATA 7200rpm, 3.5-inch	750 GB, SATA 7200rpm, 3.5-inch	500 GB, SATA 7200rpm, 3.5-inch	750 GB, SATA 7200rpm, 3.5-inch	1 TB, SATA 7200rpm, 3.5-inch	1 TB, SATA 7200rpm, 3.5-inch
Number of Disk Drives	4	4	6	12 (min), 12 x 2 (max)	12	12 (min) , 12x2 (max)	12 (min) , 12x 4 (max)
RAID Support	Hardware RAID 5	Hardware RAID 5	Hardware RAID 6	Hardware RAID 6 1 RAID hot spare drive per shelf	Hardware RAID 6	Hardware RAID 6 1 RAID hot spare drive per shelf	Hardware RAID 6 1 RAID hot spare drive per shelf
Performance (maximum aggregated data transfer rate)	325GB/hr (90 MB/s)	450GB/hr (125 MB/s)	450 GB/hr (125 MB/s)	800 GB/hr*** (222 MB/s)	325GB/hr (90 MB/s)	1.3TB/hr*** (360 MB/s)	2.4TB/hr*** (666 MB/s)
Device Interface	2 x 1 Gb iSCSI (Ethernet) (also supports	2 x 1 Gb iSCSI (Ethernet) (also supports	2 x 1 Gb iSCSI (Ethernet) OR 2 x 4 Gb	2 x 1 Gb iSCSI (Ethernet) OR 2 x 4 Gb	2 x 1 Gb iSCSI (Ethernet) OR 2 x 4 Gb	2 x 4 Gb Fibre Channel and 2 x 1 Gb iSCSI	2 x 8 Gb Fibre Channel and 2 x 10 Gb iSCSI



Technical Specifications

	100 base-T)	100 base-T)	Fibre Channel and 2 x 1 Gb iSCSI (Ethernet) (also supports 100 base-T)	Fibre Channel and 2 x 1 Gb iSCSI (Ethernet) (also supports 100 base-T)	Fibre Channel and 2 x 1 Gb iSCSI (Ethernet) (also supports 100 base-T)	(Ethernet) (also supports 100 base-T)	(Ethernet) (also supports 100 base-T)
Tape Devices Emulated	HP LTO-2 Ultrium Tape Drive /LTO-3 Ultrium Tape Drive/LTO-4 Ultrium Tape Drive/LTO-5 Ultrium Tape Drive in HP 1/8 G2 Tape Autoloader, MSL2024 Tape Library, MSL4048 Tape Library, MSL8096 Tape Library, HP D2D Backup System Generic Library with HP Ultrium D2D Generic tape drive						
Number of Virtual Tape Libraries and NAS backup targets (combined)	4	8	16	16	16	24	50
Maximum Number of Cartridges Emulated (Assumes up to 24 generic 4 drive libraries with 96 slots)	192	384	1536	1536	1536	3456	51200
Direct attach Tape Drives Supported (Legacy systems purchased before June 2010 VTL only, not supported with NAS targets, - requires pSCSI or SAS HBA D2D4312 requires Fibre Channel HBA supplied))	HP LTO-5 (Ultrium 3000 and Ultrium 3280) tape drives HP LTO-4 (Ultrium 1840 and Ultrium 1760) tape drives, HP LTO-3 (Ultrium 920 and Ultrium 960) tape drives and HP LTO-2 (Ultrium 448 and Ultrium 460) tape drives as standalone or configured in HP 1/8 G2 Autoloader, MSL2024, MSL4048 or MSL8096 Tape Libraries Tape Libraries.						

NOTE: Direct tape offload is only available on legacy systems* and is not supported with NAS targets. The recommended method of tape offload for virtual tape is to use the backup application to control and manage the copy of virtual to physical media.

* Legacy D2D backup systems include (EH993A, EH938A, EH939A, EH941A, EH942A, EJ001A, EJ002A)

*Actual results of data deduplication will vary with data type, change rates over time and backup methodologies used. Assuming standard business data mix and extended on-disk retention, typically a 20:1 data deduplication ratio could be assumed with a weekly full and daily incremental backup model.

** Assumes use of capacity upgrade kit to achieve maximum capacity

*** Assumes use of capacity upgrade kit to achieve maximum performance

Dimensions (HxWxD)	Shipping (D2D2502i, , 2504i)	8.88 x 23.31 x 38.56 in (22.5 x 59.2 x 97.9 cm)
	Out of box (D2D2502i, , 2504i)	1.70 x 17.64 x 26.85 in (4.32 x 44.80 x 68.20 cm)
	Shipping (D2D4004, D2D4009, D2D4112, D2D4106)	11.3 x 23.0 x 38.9 in (28.7 x 58.4 x 98.8 cm)
	Shipping (D2D4312)	14.7 x 23.8 x 36.1 (37.4 x 60.6 x 91.7 cm)
	Out of box (D2D4312)	6.9 x 19.1 x 28.7 (17.5 x 48.5 x 73.0 cm)
	Shipping (D2D4112/4312, D2D4106) capacity upgrade)	15.5 x 23.5x35 in (39.5 x 59.7 x 88.5cm)



Technical Specifications

	Out of box (D2D4004, D2D4009, D2D4112/4312, D2D4106) and capacity upgrade)	3.44 x 17.64 x 27.50 in (8.75 x 44.80 x 69.88 cm)
	Out of box (D2D4112/4312 capacity upgrade)	3.47 x 17.65 x 23.25 in (8.8 x 44.8 x 59 cm)
Weight (Approx)	Shipping (D2D2502i, 2504i)	51.00 lb (23 kg)
	Shipping (D2D4004)	61.5 lbs
	Shipping (D2D4009, D2D4112 D2D4106)	71.5 lbs
	Shipping (D2D4312)	109.1 lbs (49.5 Kg)
	Shipping (D2D4112/4312 capacity upgrade)	83.7 lbs (38kg)
	Out of box (D2D2502i, , 2504i)	37.00 lb (16.78 kg)
	Out of box (D2D4004)	47 lbs (21.3kg)
	Out of box (D2D4009, D2D4112 D2D4106)	57 lbs (25.8kg)
	Out of box (D2D4312)	82.7 lbs (37.5 Kg)
	Out of box (D2D4112 capacity upgrade)	54 lbs (24.5kg)
Power Requirements (per power supply)	Range Input Voltage	100 - 240 VAC
	Rated Input Frequency (D2D4004, D2D4009, D2D4112 and capacity upgrade)	50 to 60 Hz
	Rated Input Frequency (D2D2502, 2504)	47 to 63 Hz
	Rated Input Current (D2D4004, D2D4009, D2D4112, D2D4106)	9.10 A (at 100 VAC), 4.5 A (at 200 VAC)
	Rated Input Current (D2D4312)	6.90 A (at 100 VAC), 2.90 A (at 240 VAC)
	Rated Input Current (D2D4112/4312 capacity upgrade)	3.9 A (at 100 VAC), 6A Maximum
	Rated Input Current (D2D2502, 2504)	10.0 A (at 115 VAC) 5.5A (at 230 VAC)
	BTU Rating (D2D4112 D2D4106)	Maximum 1681 BTU/hr (at 100 VAC) 1646 BTU/hr (at 240 VAC)
	BTU Rating (D2D4004, 4009, D2D4106, D2D4312)	Maximum 1815 BTU/hr (at 100 VAC) 1776 BTU/hr (at 240 VAC)
	BTU Rating (D2D4312)	Maximum 2325 BTU/hr (at 100 VAC) 2270 BTU/hr (at 240 VAC)



Technical Specifications

	BTU Rating (D2D2502,2504)	Maximum 940 BTU/hr (at 100 VAC) 907 BTU/hr (at 240 VAC)
	Rated Steady-state Power (D2D4312)	552 W (at 100 VAC), 536 W (at 240 VAC)
	Rated Steady-state Power (D2D4112, D2D4106)	360 W (at 100 VAC), 386 W (at 240 VAC)
	Rated Steady-state Power (D2D2502,2504)	215W (at 100 VAC), 211W (at 240 VAC)
	Rated Steady-State Power (D2D4004,4009, D2D4106)	410 W (at 100 VAC), 430 W (at 240 VAC)
	Maximum Peak Power (D2D4312)	682 W (at 100 VAC), 666 W (at 240 VAC)
	Maximum Peak Power (D2D4112, D2D4106)	500W (at 100 VAC), 515 W (at 240 VAC)
	Maximum Peak Power (D2D4004, D2D4009, D2D4106)	540 W (at 100 VAC), 550 W (at 240 VAC)
	Maximum Peak Power (D2D2502 and D2D2504)	280W (at 100 VAC), 280 W (at 240 VAC)
	Maximum Peak Power	385 W (at 100 VAC), 390 W (at 240 VAC)
Relative Humidity (non-condensing)	Operating	10 to 90% relative humidity (Rh), 82.4° F (28° C) maximum wet bulb temperature, non-condensing
	Non Operating	5 to 95% relative humidity (Rh), 101.7° F (38.7° C) maximum wet bulb temperature, non-condensing
Temperature Range D2D 2502i, 2504i, D2D4004, D2D4009, D2D4112, D2D4106, D2D4312	Operating	50° to 95°F (10° to 35°C) at sea level with an altitude derating of 1.8°F per every 1000 ft (1.0°C per every 305 m) above sea level to a maximum of 10,000 ft (3050 m), no direct sustained sunlight. Maximum rate of change is 18°F/hr (10°C/hr). The upper limit may be limited by the type and number of options installed. System performance may be reduced if operating with a fan fault or above 86°F (30°C)
	Non Operating (D2D2502i, 2504i, D2D4004, D2D4009, D2D4112, D2D4106, D2D4312)	22° to 140° F (-30° to 60° C). Maximum rate of change is 36° F/hr (20° C/hr)
	Non Operating (D2D4112/4312 capacity upgrade)	-40° to 150° F (-40° to 66° C)
	Heat Dissipation (maximum) D2D4112/4312 capacity upgrade	1175 Btu/hr* * Input Power and Heat Dissipation specifications are maximum values and apply to worst-case conditions at full rated power supply load. The power/heat dissipation for your installation will vary depending on the equipment configuration.
Acoustic Noise D2D4004/D2D4009/	Idle (disks spinning)	Listed are the declared A-Weighted sound power levels (LWAd) and declared average bystander position A-Weighted sound pressure levels (LpAm) when



Technical Specifications

D2D4112/ D2D4106/
D2D4312

the product is operating in a 23°C ambient environment

Operating
(random seeks to disks)

LWAd 6.7 B LpAm 51 dBA
LWAd 4.9 B LpAm 31 dBA (D2D4312 only)

Listed are the declared A-Weighted sound power levels (LWAd) and declared average bystander position A-Weighted sound pressure levels (LpAm) when the product is operating in a 23°C ambient environment

Acoustic Noise
D2D2502i, 2504i)

Idle (disks spinning)

LWAd 6.7 B LpAm 51 dBA
LWAd 5.0 B LpAm 32 dBA (D2D4312 only)

Listed are the declared A-Weighted sound power levels (LWAd) and declared average bystander position A-Weighted sound pressure levels (LpAm) when the product is operating in a 23°C ambient environment. Noise emissions were measured in accordance with ISO 7779 (ECMA 74) and declared in accordance with ISO 9296 (ECMA 109).

Operating (random seeks to disks)

LWAd 6.82 B LpAm 51.93 dBA

Listed are the declared A-Weighted sound power levels (LWAd) and declared average bystander position A-Weighted sound pressure levels (LpAm) when the product is operating in a 23°C ambient environment. Noise emissions were measured in accordance with ISO 7779 (ECMA 74) and declared in accordance with ISO 9296 (ECMA 109).

LWAd 6.84 B LpAm 51.93 dBA

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For hard drives, 1 GB = 1 billion bytes. Actual formatted capacity is less.

