
CACHE-A

Prime-Cache / Pro-Cache LTO-4A Data Tape Deck Archive Appliance Manual



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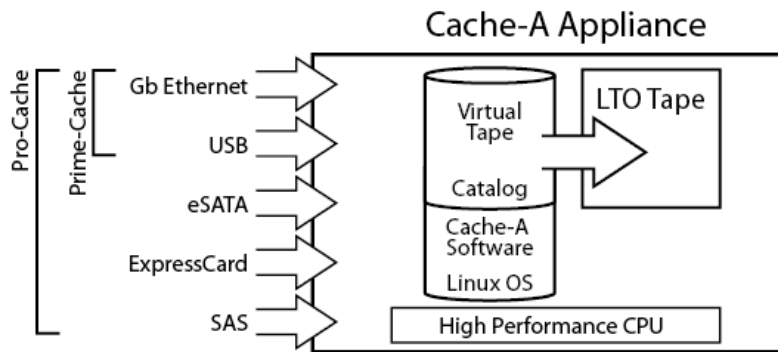
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Chapter 1: Introduction

Cache-A archive appliances were created to provide an easy and flexible means for archiving, backing up and restoring data. Stand-alone LTO-4 based systems are appropriate for users with anticipated requirements to archive from tens to hundreds of Terabytes of data.

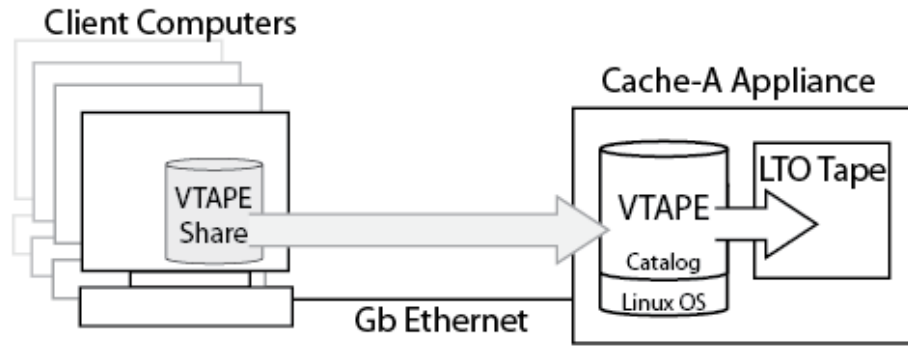
Cache-A archive appliances are designed to assist video and other media professionals meet their needs in storing and archiving large image content files. These archive appliances are able to store and share all forms of computer data including high definition and standard definition video files for video production and archiving.

Cache-A archive appliances are comprised of a hard disk drive (or array), an LTO-4 Data Tape drive, a high performance compact computer server running Fedora Linux, and a variety of external interfaces. These components are packaged with a file tracking catalog database and software to make a complete integrated system with everything needed for archiving in an easy-to-use appliance.



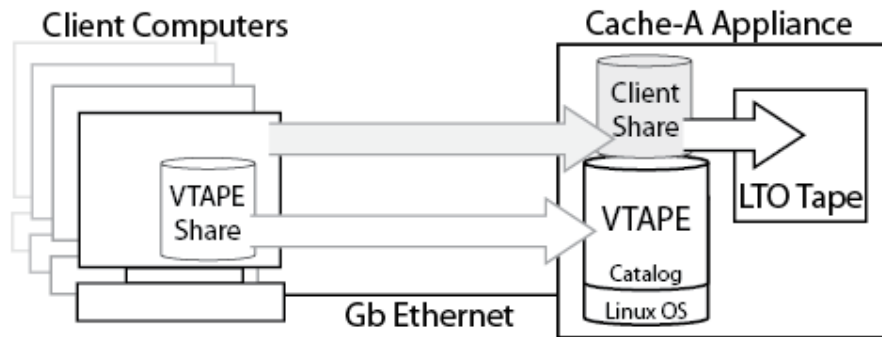
Archive Appliance constituent components

Cache-A archive appliances offer a variety of connection interfaces. Basic Network attachment is supported by a Gigabit Ethernet interface and provides the ability to mount the A-Series internal disk storage as a “share” on any other computer on the network (or multiple computers concurrently). Data can be easily archived simply by dropping files onto the shared folder, or “VTAPE” that represents the tape. From there, it is automatically archived to tape in the background without any need for further user actions.



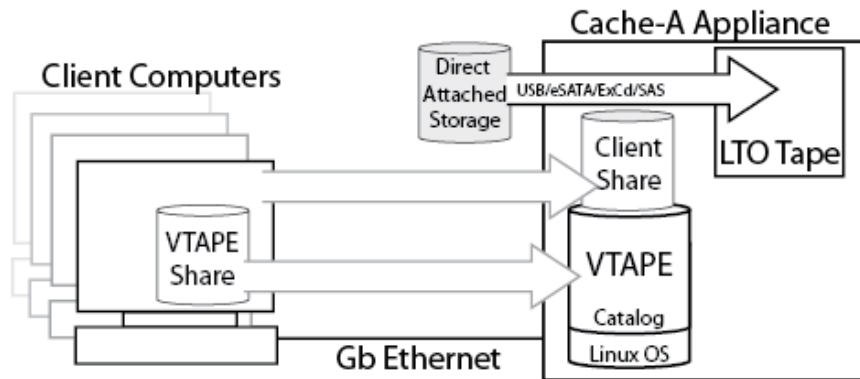
Archive Appliance VTape Sharing

The Gigabit Ethernet interface also allows the A-Series to do the inverse, that is, mount any shared folder of any computer on the network itself using the “Mount Manager” facility (SMB or NFS shares only at this time). Contents of these shared folders can be archived manually using the web-page-based “File Manager” or automatically using the web-page-based “Backup Schedule” facility.



Archive Appliance Client Sharing

In addition, external storage volumes ranging from RAM cards to hard disks can be directly attached through the physical connections provided on each system. Prime-Cache systems offer 6 USB ports for this purpose. Pro-Cache systems offer 6 USB ports plus one eSATA, one ExpressCard slot and one multilane connector with 3 lanes of SAS and one lane of SATA.



Archive Appliance Direct Attached Storage

Each data tape cartridge contains a table of contents (TOC) that provides a hierarchical directory of the tape's file system, allowing you to treat the contents of the tape similarly to that of a hard disk drive and giving independent access to any individual file or group of files stored on the tape. This TOC is written to the tape by the archive appliance's tape manager software after each data transfer session at the end of data (EOD). This TOC is also saved in the deck's internal Catalog which tracks all tapes it has ever seen.

System Preparation

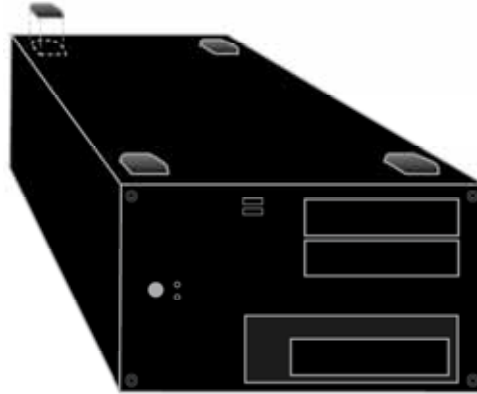
Cache-A archive appliances are designed to be used in a wide variety of environments but users should attempt to keep the system in a reasonably cool, low humidity and clean area. There is wide latitude for this within the systems specifications, but the life of tapes and the tape drive will depend to some extent on these parameters.

Prime-Cache is intended for tabletop operation and can be used standing up vertically or lying on its side with the drive toward the top (drive door opens up).

Pro-Cache is intended either for tabletop or rack-mount applications used with our rack mounting kit or on a rack tray.

Installing Pro-Cache Desktop Feet

If the system is not going to be rack mounted, invert the unit onto a soft surface to prevent scratching the top and install the 4 adhesive backed rubber feet provided.

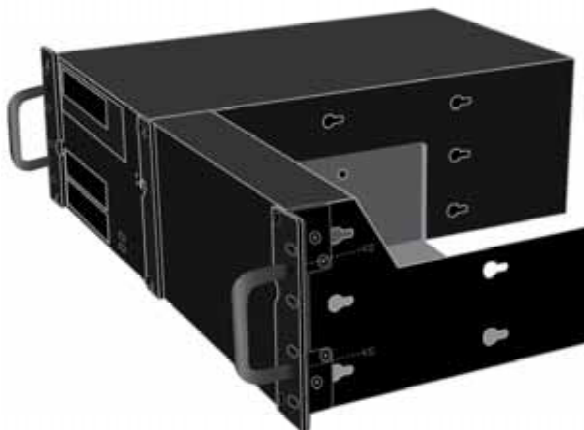


Adding Rubber Feet to Pro-Cache

Assure that the bottom surface of the unit is clean and dry and press each foot on each of the 4 corners of the bottom of the unit. Install the feet about ½” or 1 cm in from each corner of the unit for maximum stability. Do not install any feet if the Rack Kit is to be used.

Installing the Pro-Cache Rack Kit

One or two Pro-Cache units may be mounted in a 3RU rack space. Consult the complete instructions for rack installation that accompany each Pro-Cache rack kit.



Pro-Cache Rack Kit

Chapter 2: Getting Started

This chapter describes how to set up your Cache-A archive appliance and shows the basic approaches for archiving files.

- Setting up a Cache-A archive appliance on your network
- Accessing the Cache-A archive appliance from your Browser
- Simple Archiving to a Network Share
- Simple Restoring with the Web Based File Manager

This section will get you started, however, you are encouraged to read at least the Cache-A technologies chapter to understand the power of your archive appliance.

Setting Up a Cache-A Archive Appliance on your Network

By default, Cache-A archive appliances must be connected to an Ethernet network with DHCP and will obtain a connection via an assigned IP address. This means your network needs to include at least a client computer, the Cache-A deck and a router.

You can use either of two Ethernet connections available on the back panel of the Cache-A archive appliance.



Archive Appliance Network Connection



Warning

If you want to employ a user defined static IP address you can do so from the Network Settings page of the Cache-A A-Series web page (see Network Setting section for more details). Making this change may make your system unreachable if you forget its IP address or if you connect to the wrong port.

This can be done from the browser which is normally reached through the DHCP setup referenced above – or – you can connect a monitor, keyboard and mouse directly to the back panel of the unit (see Maintenance Terminal section for more details).

Once the system is connected to a DHCP network, connect power and turn on the system by pressing the power button on the front panel.



**This may
take a few
minutes**

Note that DHCP assignment may take some time on some network configurations. Also Bonjour name advertisement may appear within a few seconds but can take a few minutes on some network/system combinations.

Accessing the Cache-A Web Page

In order to get started using your Cache-A Archive appliance, you will first need to access it from a browser and confirm initializing a tape as described below.

You will need to know the Host Name or Bonjour Name of your Cache-A device to proceed. The default hostname of any Cache-A Archive appliance is:

archiveXX

where XX is the last two digits of your serial number. For example serial #CA-P4001-30010 would be *archive10*.

Accessing the Cache-A web page on a Mac:

Either the system's **Bonjour name** or its **IP address** can be used to access the system's web page.

The Bonjour name of any Cache-A Archive appliance is:

hostname.local -or- archiveXX.local

where XX is the last two digits of your serial number. For example serial #CA-P4001-30010 would be *archive10.local*

You can access the Cache-A web page by typing the Bonjour name (*archiveXX.local*) in your browser's URL bar. If you are using Safari, you can also find the Bonjour name as a clickable link under Safari's **Bookmarks** > **Bonjour** item.

The system's **hostname** or its IP address can be used to mount the network share – you should see the hostname in the “SHARED” group in the left column of any Finder window.

Accessing the Cache-A web page on a PC:

Some PCs also have Bonjour services installed (i.e. if the PC has iTunes installed) and that would allow the same naming as noted above.

The Cache-A web page can also be accessed on most PC systems simply by typing the hostname (*archiveXX*) in your browser's URL bar.

Accessing the Cache-A web page by IP Address:

On any operating system you can always reach a Cache-A system by typing the system's IP address in the URL bar (i.e. `http://192.168.1.123`).

You can find your Cache-A archive appliance's router-assigned IP address by connecting to your router and viewing its DHCP assignment table. You can also connect a maintenance terminal from which you can launch Firefox and view the network settings page.

The Cache-A Archive Appliance Browser Interface

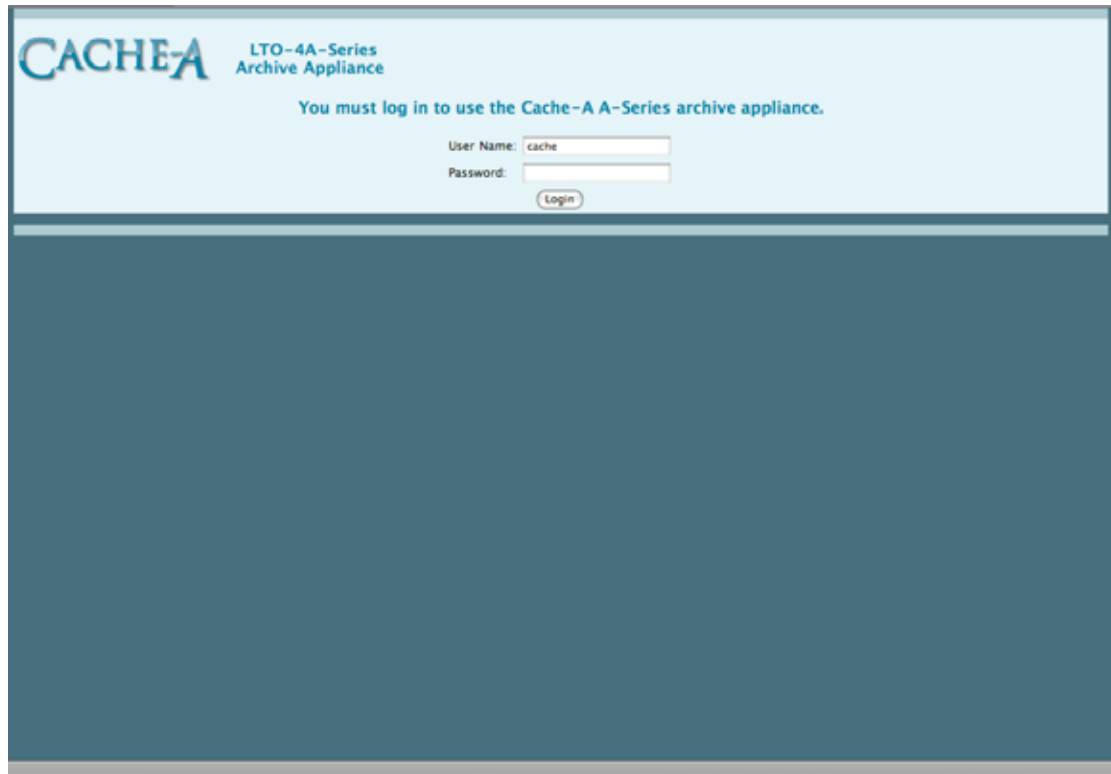
The first step towards using a Cache-A Archive appliance is to bring up its web page so you can control and monitor the system's activity. This will also allow you to initialize your first tape.



Important

NOTE: Cache-A software has been tested with Firefox and Safari web browsers – this user interface will does not work properly with Windows Internet Explorer.

When you have connected to your Cache-A system as outlined above, you will see the **Login** Page:



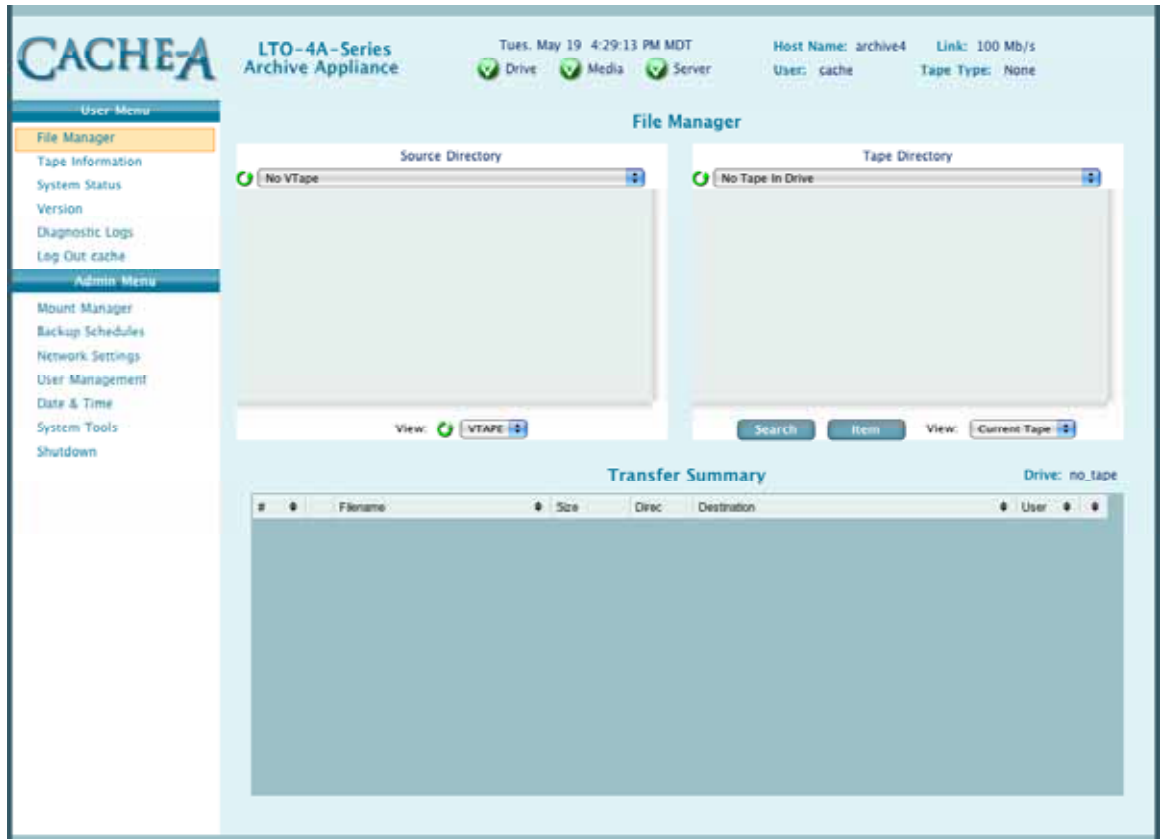
The Cache-A Archive Appliance Login Page

Type in the User Name and Password in the spaces provided:

- The default login user name is **cache**
- The associated default password is **cache123**

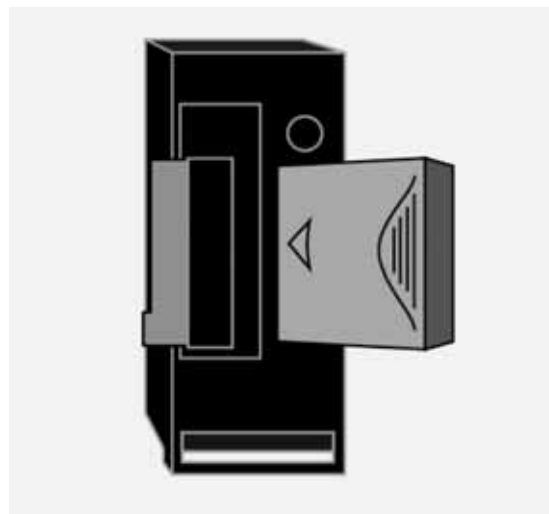
We recommend you keep this user and password to always have an easy way into the system, however users can be added and this password can be changed later if desired.

When you have successfully logged in, you will see the **File Manager** page:



The Cache-A Archive Appliance blank File Manager Page

The next step towards using a Cache-A Archive appliance is to insert a blank tape. To do so, lift the flap over the drive tape hole and orient the tape so that the arrow on the top of the tape cartridge is pointing into the hole. Slide the tape in until the mechanism grabs it (which occurs about 3/4" from flush) – the drive will draw the tape cartridge in and complete the insertion process.



Inserting a tape into your Archive Appliance



**This may
take a few
moments**

Once the system has threaded the tape into the drive and read the solid-state memory in the tape, it will recognize that you have inserted a new tape cartridge and present you with the following dialog:



Archive Appliance Initialize Tape Dialog

Select **Initialize** in this dialog and wait for the File Manager web page to update – this is complete when it shows the tape cartridge’s Manufacturer’s ID number in the title button over the Tape Directory List:



Archive Appliance Tape Ready for Use

You are now ready to begin archiving.

Simple Archiving to a Network Share

Cache-A Archive Appliances offer many methods to archive content. These various methods are based on accessing user data from one of the following sources:

- Via the **network shared volume** offered by the appliance where you drop content and allow it to be automatically backed up (covered below – for more detail see the Network Share Guidelines section).
- Via a **client shared volume** where the appliance mounts a folder on one or more of the computers on your network (see the Mount Manager section for more information).
- Via a **direct mounted volume** that is physically connected to the appliance’s USB, SATA, SAS, or ExpressCard slot (see the Direct Mount section for more information).

The easiest way to get started archiving is to use the Network Share method.

Mount the Cache-A archive appliance to your client computer by using one of the following methods.

Mounting the share on a Mac:

The system will appear in the Finder by its Host name in the **SHARED** Item of the left column. Mount the Cache-A network share by highlighting that item and clicking on the **Connect As** button and providing your Cache-A user name and password (default: **cache**, **cache123**):



Mounting the Archive Appliance on a Mac

Cache-A shares can appear twice under the “SHARED” column as OS X systems will see both the normal Macintosh (afp) and Windows (SMB) share offered by each system. Note: you can

archive using the Windows share however, this is not recommended: you may experience name changes when illegal windows characters appear in your filenames and you may lose file metadata in resource forks (see Best Practices section for more information about this).

Mounting the share on a PC:

The system will appear in the Windows Explorer when you Search your Network Neighborhood for your appliance hostname. Mount the Cache-A network share by opening your Windows Network Neighborhood view – depending upon the windows version, the Cache-A share may be displayed automatically. If it is not, search for the windows share name **archiveXX**. You should also be able to directly locate the system by typing its explicit path as **\\ARCHIVEXX\CACHE_A**

Once the share has been found, you can mount it using standard windows techniques (i.e. “**Map Network Drive**”) and the same username and password (default: **cache**, **cache123**).

Prepared to Archive

Now that you have the Archive Appliance mounted, you will see the Cache-A share containing:

- a folder labeled with a number - this represents the tape itself (as explained below this folder is referred to as the “**VTAPE**”)
- a file called **Eject** which can be used to eject the tape cartridge by dragging it to the trash or otherwise deleting it

What is the VTAPE?

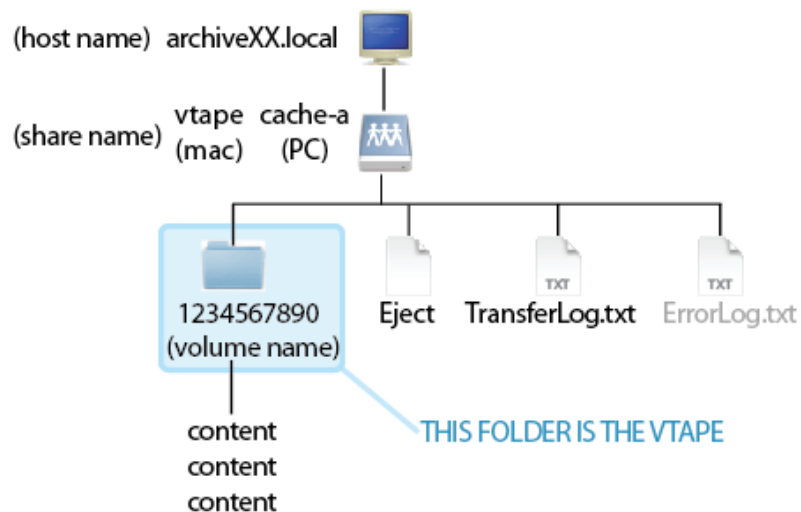
The name “VTAPE” is short for “virtual tape” and is what allows the archive appliance to be shared by multiple users and to effectively mount a tape as if it were disk based storage (it is, in fact, disk storage). When we talk about the VTAPE throughout this manual – it is this folder to which we refer. The number that initially appears on this folder is the hard coded manufacturer’s unique tape cartridge ID that the appliance uses for the tape name by default. When you rename the tape cartridge, this folder will inherit whatever new name you assign (or vice versa, you can rename the folder and the tape will inherit that name). This is also known as the “Volume Name” of the tape.



Warning

NOTE: Do not delete the VTAPE folder from the Windows or Mac desktop – doing so will prevent archiving.

The following diagram shows the structure of a Cache-A share. On a PC the share will be named “CACHE-A” and on a Mac, it will appear as “vtape” – do not be confused by the Mac share name – the actual VTAPE is the folder within the share with the tape name – in this example the tape has an ID of “1234567890.”



Archive Appliance Mount Structure

To begin archiving, simply drop your content onto the VTAPE folder (the folder which represents the tape cartridge). Once you have copied one or more items into the VTAPE you will also see a Transfer log and, if any problems occurred, an Error log as shown in the preceding diagram.

For most users this is all it takes to archive – copy your files to this shared folder and the system will take care of the rest. There are many implications to this and we strongly suggest you read the “Unique Cache-A Technologies” section of this manual if you want to maximize your archiving flexibility.

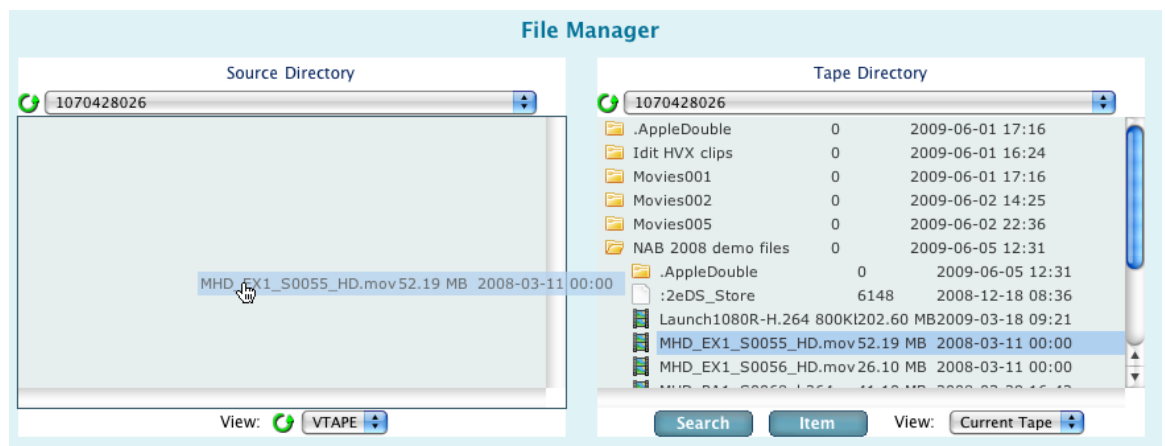
Simple Restoring with the Web Based File Manager

The Cache-A Archive Appliance File Manager web page offers tools for recovering data from your catalog of tape cartridges.

Restoring Files

Files to be restored are selected in the Tape Directory column and moved to the Source Directory column. Normally restored files are moved onto the VTAPE and from there, used as needed. Assure that this is the case by noting that “VTAPE” appears in the dropdown menu at the bottom of the column.

Navigate the contents of the current tape by double clicking folders in the Tape Directory list (see the File Manager section below for more help on navigation). Once the desired file or directory is displayed, it can be restored by simply dragging them from that list on the right to the Source Directory list on the left.



Restoring a Single File with Drag and Drop

Multiple files and/or directories can be selected using the shift key and dragged as a group to restore more than a single item.

Searching for Files

You may know what files on what tape cartridge you are interested in restoring, but frequently you will begin with a search of your catalog to find the tape containing the files with the names in which you are interested. Search for your files by selecting the **Search** button and typing in all or part of the file name you are seeking.

The search results will show all of the tapes containing files that match your search string. Double clicking on any tape will “open” it and allow you to see the exact files that matched. Searching can also be used to find Barcodes and metadata as described in the Searching section of this manual.

Eject the current tape cartridge (if one is currently loaded) and insert the tape cartridge containing the files you want to restore. You can eject using the eject button on the drive’s front panel or by selecting the **Item** button and the **Eject** item in the popup menu.

Chapter 3: Cache-A

Unique Technologies

The Getting Started section above touches on some of the unique technologies used in Cache-A archive appliances. This chapter is devoted to explaining in more detail how these technologies are implemented, the concepts behind them and how to make the most of them.

As these products contain many powerful capabilities that are different from most archive tools on the market, this section of the manual will be important to any user who wants to fully explore the uses of their archive appliance.

The A-Series VTAPE

Cache-A's VTAPE technology is quite different from any other archiving solution. When used in its basic form (drop your files and forget them) archiving operations are incredibly simple. As soon as you want to do something different however, there are many implications that should be understood and are covered in this chapter.

Managing Your Content

In order to keep your content organized, you should make a practice of archiving your data already contained in folders or of creating folders on the VTAPE into which you drop files before you begin. Thousands of loose files at the top level of a tape will be difficult to manage.

Cache-A A-Series Archive Tapes do not allow the user to reorganize or rename files on the tape cartridge. Once content is archived, it will remain on the tape as archived until that tape is erased.

The Archive Appliance will archive files with the names and hierarchy they have when they are moved to the VTAPE. While you will be able move and change file names in the VTAPE but you are not changing what is on the tape. This can cause a number of problems (see below) so we strongly recommend that you not do this.



Important

The process of adding anything to the VTAPE creates an event to copy that set of files. Once the queue for copying those files to tape is completed, it doesn't matter what happens to those files on the VTAPE – that is to say, you could change names, delete files, and so on, but it will not affect what got archived. That said, note the following warning:



Warning

If you attempt to change the name of files in the VTAPE before or while they are being copied to tape, you may cause serious archiving errors.

This also implies what will be obvious if you think about it, that if you attempt to Cancel an archive while files are still being copied to the VTAPE, it will not be able to cancel since each new file copied creates a new event to archive. Thus:



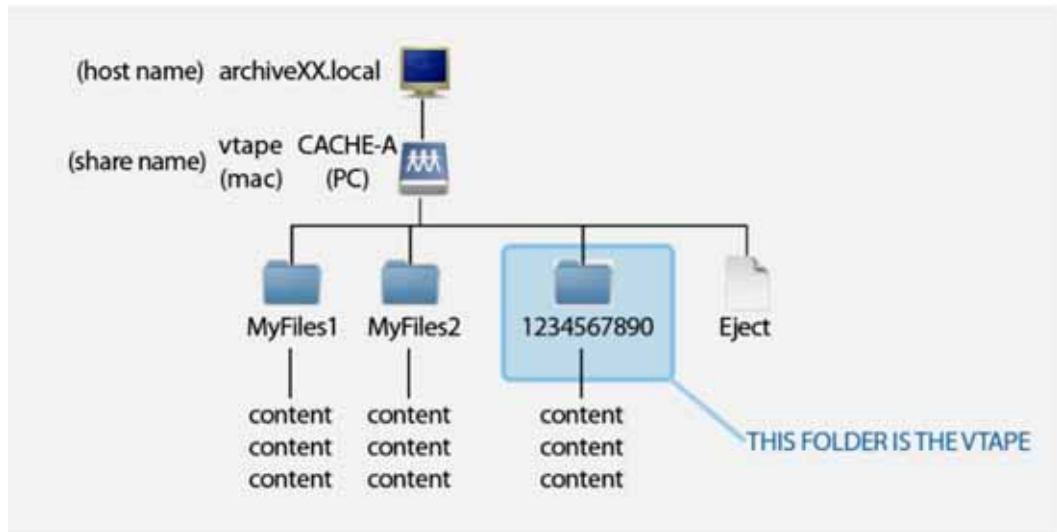
Warning

Do not attempt to Cancel a transfer while files are being copied into the VTAPE – it will NOT cancel and you will cause archiving errors.

Organizing Techniques

You can store content anywhere on the Archive Appliance share volume – only content placed into the VTAPE folder will be archived to tape.

- Placing your data at the top level of the shared volume will allow you to reorganize and rename your data prior to archiving. Once you have manipulated your files to your satisfaction, you can drag from the top level onto the VTAPE to initiate the archive-to-tape process.



Example of Using the Share to Organize Your Files

In the example above, a user has created a couple of folders “MyFiles1” and “MyFiles2” in which to organize content. Archiving will not start until you drop them into the VTAPE folder (“1234567890” in this example).

- You must manually remove any content not placed in the VTAPE in order to free up space for further archiving – failure to do so can result in insufficient space on your VTAPE to fill your LTO tape.
- For example, in the figure above, suppose you only dropped MyFiles1 into the VTAPE – MyFiles2 would still be hanging around taking up space and would not be erased when you clear the VTAPE so must be manually removed.
- If you have files in your VTAPE that you want to continue to use for any reason, you can go the reverse direction and make the VTAPE into a regular folder by ejecting, not erasing the VTAPE and then renaming the folder. I.e. in the above example, after ejecting tape “1234567890,” you could rename that folder “MyFiles1.” This may be useful for instance if you wanted add the same set of files to several tapes or to simply continue to use the Cache-A share to work with those files.

Cache-A A-Series Archive Tapes allow users to store multiple copies of any file with the same name in the same folder.

- Only one copy appears of each duplicated file appears in the directory list but all versions are listed in the File Info dialog with dates associated with each version. If the file already existed on the VTAPE, it will be replaced on disk, but an additional copy will still be made on tape.
- Users may want to manually change the file name before archiving if better version tracking is needed.

The contents of the VTAPE folder may not contain the same information as the tape cartridge that it represents.

- This will never happen if you fill each tape cartridge, then erase the VTAPE and start fresh with the next tape.
- When you eject a tape, you will be asked if you want to erase the VTAPE – unless you have a good reason not to erase the VTAPE, you should always select **Erase**.
- One good reason to keep the contents of the VTAPE is if you want to make a second copy of the data you just archived. In this case, simply insert a new tape, and then select the **Copy** button in the **New Tape Inserted** dialog.
- As you use the system, you may have partially filled tapes, want to eject them and add different content to other tapes, etc. Under these circumstances you also may want to preserve the items in your VTAPE – please read each dialog carefully when choosing how you will manage this data.

Managing VTAPE and Physical Tape Capacity

Cache-A archive appliances take advantage of the fact that LTO series drives have hardware to losslessly compress data on the fly without impacting transfer rates or data quality. Some data will not compress at all, and some may compress up to 2:1. Because of this, either of two scenarios can cause problems: a) the VTAPE can contain more data than will fit on a tape cartridge or b) the tape cartridge can contain more data than will fit on the VTAPE.

Video professionals should never be concerned about any quality impact of this compression – it is guaranteed to have bit for bit accuracy when restoring files.



Important

Tape and VTAPE disk capacity is normally manually managed by the user when archiving files. The **Multiple Volumes** (Tape Spanning mode) capability allows you to ignore Tape capacity as long as you have additional tapes to insert upon filling the Current Tape. The **Remove Files** (Auto VTAPE Management mode) capability allows you to ignore the VTAPE capacity as long as you have enough tapes and keep loading them to stay ahead of your data archive copying.

Multiple Volumes and Remove Files capabilities are discussed under the System Tools > Settings section. When these capabilities are not enabled, you should observe the following cautions:

- The VTAPE is a 900 GB file system* and is big enough to fill an LTO4 tape cartridge with no compression. If you were to archive only IT type data (text, spreadsheets, etc.) you could put as much as 1600 GB on the tape - the VTAPE is obviously not big enough for that all in one go, so you may have to erase it to add more data.
* the VTAPE only on a Pro-Cache system configured for RAID0 mode is an 1800GB file system
- The Tape info window may display a negative number for Space Lost – this indicates that your data did compress somewhat. This number is actually a combined report of how much data compressed less actual losses from read-write start-stops, bad blocks, etc.
- When the VTAPE is full, it won't let you put any more on it. Thus if the tape is not full because of lossless compression, you will have to erase it or remove some data from the VTAPE in order to copy more onto the tape.
- It is possible that when archiving and the tape becomes full, if there is more data on the VTAPE than will fit, the system will stop archiving files at that point.
- If you try to restore all of a tape that contains more uncompressed data than the VTAPE will hold, the restore will stop when the VTAPE file system is full.

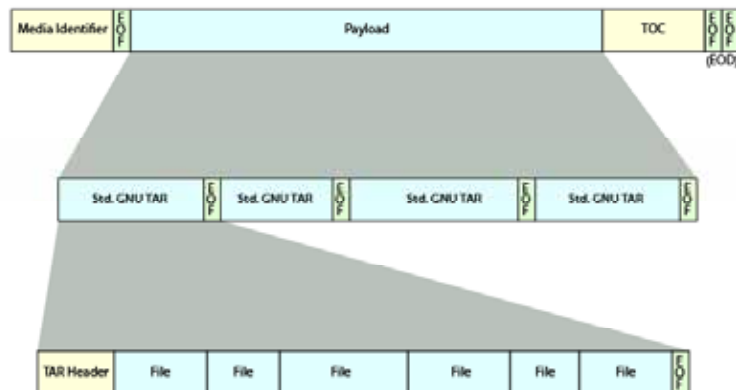
- The system preserves enough space on tape to write the TOC so may not let you archive files even though it appears to have enough room. To assure this is always the case, it is a bad idea to try to cram every possible bit onto your tapes. We recommend you target no more than 730GB per tape to avoid any possible issues.

The A-Series Table of Contents and Catalog

Cache-A archive appliances maintain a Table of Contents (TOC) on each tape cartridge and maintain an internal searchable Catalog of every TOC it has ever seen in a database.

The TOC provides a hard disk drive-like directory of each tape cartridge file system, allowing users to view and independently access to any individual file or group of files stored on the tape cartridge. This TOC is written to the tape by the deck's tape manager software after each data transfer session is completed and is placed at the end of data (EOD).

The only way to see the TOC of a Cache-A tape is to either view the Catalog record for it or to put it in a Cache-A deck - this is the only proprietary file on Cache-A tapes. The following diagram shows how data is organized on tape and where the TOC may be found.



Cache-A Data Format on Tape

On non-A-Series LTO4 drives, it is possible to use standard GNU or POSIX compliant tar utilities (version 1.20 or greater) to un-tar an entire tape and see the full contents of any Cache-A A-Series

tape. Contact Cache-A technical support for more information about using tar with our tapes in other systems.

Every LTO tape contains a cartridge Memory Information Chip (aka. the “MIC” chip or the “CM” cartridge memory) that is read upon insertion using RFID technology. This chip contains a wide variety of tape information, much of which can be viewed in the Tape Information dialog (see that section below for more information). The TOC is too big to fit in this chip and is not stored here, but the date and time last written is (along with information about the TOC’s integrity).

On a system that has written any tape, there will be a copy of that tape’s TOC in the Catalog. However, since the tape may have been modified in another Cache-A appliance, that copy may or may not be up-to-date, so the system uses that MIC chip to discover if in fact that has happened. As soon as any tape is loaded into any Cache-A deck, the tape ID and last written date/time is pulled from the tape's memory chip and compared to the Catalog. If it is a match, the system instantly displays the internal copy of the TOC. If that information is either not in the catalog or it is newer than the catalog, the TOC is read from tape and the Catalog is updated.



**This may
take some
time**

Reading the TOC from the tape may be very quick or can take quite a bit of time depending upon where on the tape it is stored (tape seek time can be up to 2 minutes) and how big it is (TOCs can contain a directory of hundreds of thousands of small files). The system will display a wait dialog when importing a TOC – do not interrupt this process or you will end up with a partial representation of the tape’s contents in the catalog.

Managing the Catalog

Normally, the Catalog is self-maintaining and requires no user intervention. Any change you make to any tape, including erasing it, is immediately updated in the catalog. As noted above, any time you insert any tape into a deck, that TOC is added to the Catalog.

If you did not want to add that tape to your Catalog, or if you have removed a tape from your shelves, you can remove it from the Catalog by selecting it in the Catalog List and selecting Delete from the Item Menu (see the File Manager section for more information).

The internal Catalog is stored on the local hard disk and is very unlikely ever have problems. However, in the event of a catastrophic hard disk crash, this database could be lost.

There is a user-initiated Catalog backup utility to allow you to backup the Catalog onto the VTAPE and thus onto the Current tape if loaded - this also allows you to copy it to other media such as a USB drive or any other volume. This function may be found under the Catalog Backup tab of the System Tools page (see that section for more information).

Restoring your backup Catalog will require a call to Cache-A technical support to allow our service technician to restore the database. There will be user facilities to handle this in future versions.

In a disaster scenario, if the Catalog is completely lost, you can rebuild the Catalog by inserting each tape in your collection, wait for the TOC to be read and eject. Note that this will be a time consuming effort. The best way to avoid ever having to rebuild your catalog is by making regular catalog backups.

Neither the TOC nor the Catalog have real size limitations - they grow as big as they need to be, using up tape space and VTAPE space as needed. Future releases will optionally add .mxfl, .r3d and .mov metadata to each TOC containing those file types. The TOC may grow significantly from this additional data but not likely to ever be a serious portion of the hundreds of Gigabytes available.

Chapter 4: Browser Interface Reference

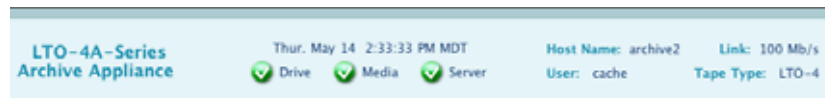
This chapter provides a complete reference description of each item in the browser based Cache-A archive appliance user interface.

Header and Main Menu

The Cache-A archive appliance web interface includes two areas that remain available across all web pages, the header and the left column main menu.

Header

The header at the top of all web menus provides important information about the current state of the archive appliance and is the first place to go to view the status of any system.



Archive Appliance Header

The current system date and time is displayed at the top left information group – you can change the date and time setting from the **Date & Time** admin menu page.

Below the date is a display for the current health of the three main appliance subsystems, the **Drive** (the LTO4 tape drive), the **Media** (the tape itself), and the **Server** (internal computer and software). These will normally show green check marks but may display a yellow warning icon or a red stop icon depending upon the severity of any problem that may exist. You may click on any of these icons to take you immediately to the **System Status** page where additional status information is displayed.

The **Host Name** item displays the configured hostname for this system. By default this is *archiveXX* where *XX* is the last two digits of your serial number. For example serial #CA-P4001-30010 would be *archive10*. The hostname can be changed in the **Network Settings** page.

The **User** item displays the name of the currently logged-in user. User names, passwords and privilege level adding and removing users can be administered in the **User Management** page.

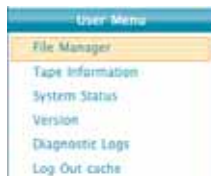
The **Link** item shows the Ethernet connection speed detected by the system. For optimum performance this display should show 1000 Mb/s for Gigabit Ethernet connection speed.

The **Tape Type** item shows what kind of tape the system has detected is present, or **No Tape** if no tape is detected. The system may display and will work with **LTO-4** and **LTO-3** data tape cartridges.

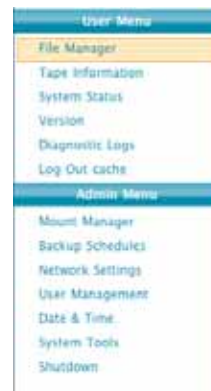
Main Menu

The main menu system down the left side of the web display allows access to all major subsections of the system operations.

Not all menu items are available to all users. Two user privilege levels are available, **user** and **admin** when setting up new users on the system – all users not given admin level privileges will not see the items in the lower **Admin Menu** section.



User Menu



Admin Menu

Archive Appliance Main Menus

Each item in the Main Menu is described in the following sections.

File Manager

The **File Manager** page provides two areas for viewing and managing files on the system.

The Upper area labeled **File Manager** allows viewing the contents of the tape, the VTAPE, or any other volume mounted on the appliance. The File Manager columns may also be used via drag-and-drop to move content to the tape (archive) or to move content from the tape to the VTAPE or other mounted volume (restore).

The lower area labeled **Transfer Summary** is the primary tool for monitoring system activity and shows the drive status, what files have actually been moved in what direction, and what the system is currently doing.

The screenshot displays the Cache-A File Manager interface. At the top, it shows the system name 'CACHE-A LTO-4A-Series Archive Appliance', the date and time 'Thur. May 14 2:33:33 PM MDT', and system status indicators for Drive, Media, and Server. The top right corner displays 'Host Name: archive2', 'Link: 100 Mb/s', 'User: cache', and 'Tape Type: LTO-4'. A left-hand navigation menu includes 'User Menu' (File Manager, Tape Information, System Status, Version, Diagnostic Logs, Log Out cache) and 'Admin Menu' (Mount Manager, Backup Schedules, Network Settings, User Management, Date & Time, System Tools, Shutdown). The main area is titled 'File Manager' and is split into two panels: 'Source Directory' and 'Tape Directory'. Both panels show a tree view for 'mbwhi data' with sub-directories like '.AppleDouble', 'ArchiveTest', 'Movies1-3', and 'NAB 2008 demo files'. Below these panels are 'View' and 'VTAPE' buttons. The bottom section is 'Transfer Summary', which includes a table of file transfer activities and a 'Drive: ready' status.

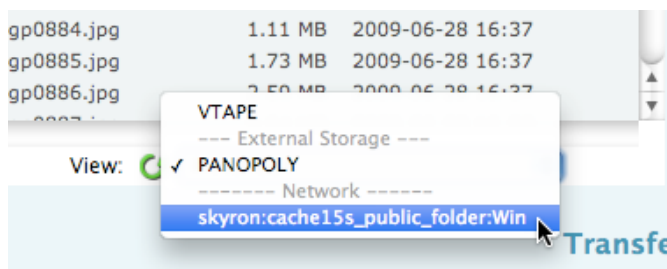
#	Filename	Size	Dir	Destination	User	Status
11189.5	yeeha.mov	3979	Archive	Movies3/tg/.AppleDouble/yeeha.mov	cache	✓
11190.5	sgpowder.mov 01	32.84 Mb	Archive	Movies3/tg/yeeha/Media/sgpowder.mov 01	cache	✓
11191.5	ltpowder.mov 01	14709	Archive	Movies3/tg/yeeha/Media/.AppleDouble/ltpowder.mov 01	cache	✓
11192.5	ltpowder.mov 01	47.38 Mb	Archive	Movies3/tg/yeeha/Media/ltpowder.mov 01	cache	✓
11193.5	yeeha	1252	Archive	Movies3/tg/yeeha/yeeha	cache	✓
11194.5	yeeha.Movie2Project	1252	Archive	Movies3/tg/yeeha/yeeha.Movie2Project	cache	✓
11195.5	yeeha.mov	3979	Archive	Movies3/tg/.AppleDouble/yeeha.mov	cache	✓
11196.5	yeeha.mov	2.13 Mb	Archive	Movies3/tg/yeeha.mov	cache	✓
11197	Session ended: 05/14/09 1:47:48 pm					
11198	Total: 1419	2.78 Gb	Archive	Transfer Rate: 12726.52 kb/sec;		✓

Archive Appliance File Manager Page

File Manager Operations

Each of the two lists in the file manager display all the files on whatever volume is selected in the **View** dropdown menu under each column.

The **Source Directory** column is nominally where files are coming from when archiving (the file source). This column will in fact be the destination, not the source when restoring. By default the Source Directory column will show the contents of the **VTAPE**. Users can also select via the **View** dropdown any mounted volume on the system and this will include both network mounted volumes (see Mount Manager below) as well as direct-attached volumes which include any storage device plugged into the appliance via the USB ports. On Pro-Cache models, this also includes any storage device connected via the eSATA, SAS, or ExpressCard interface. There may be occasions where the **View** dropdown does not show all currently mounted volumes – if this happens, select the green **refresh** button to update the list.



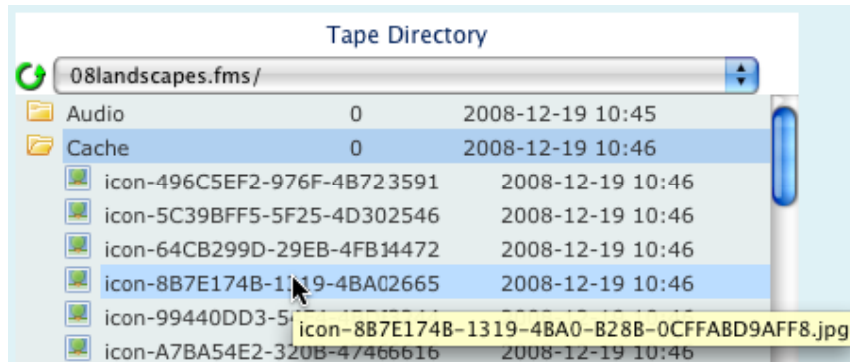
Source Directory View Dropdown Menu

The **View** dropdown menu contains three sections. The **VTAPE** is always shown at the top of this menu followed by any direct-attached devices identified with the **External Storage** header and then network-attached devices, identified with the **Network** header.

There may also be occasions when the entire list does not show all the files/folders you expect to see there and an additional refresh button is provided at the top of each column to update the file lists (this will most often occur while the system is copying data and has not completed the transfer).

The **Tape Directory** column by default shows the contents of the current tape as shown in its **View** dropdown. The View dropdown for this column allows it to be used to view the contents of the **Current Tape**, the **VTAPE** for a variety of management operations (see below) and to be used to view every tape the system has ever seen by selecting the tape **Catalog**.

There may be many occasions where the full file or directory name is not visible in these file lists due to truncation from limited space. By briefly holding the mouse cursor still over any entry on these lists, a tool tip will appear with the full name. NOTE: this also works on file sizes as well as items in the Transfer List below.



File List Tool Tips to Display Full Name

The method for archiving or restoring files within the File Manager is to drag-and-drop files between the two columns with any combination of **View** listings except the **Catalog** (since you can't access tapes that are not in the system) as described below.

File and Folder Selection and Movement

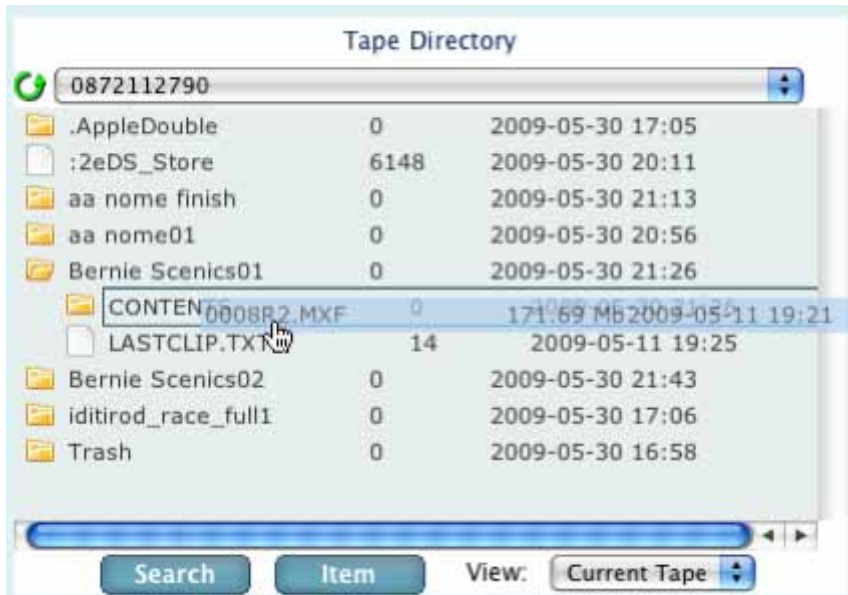
To select an item in the directory lists, you must click on the text portion of the item – you cannot click on the icon to the left of the text.

You may directly drag-and-drop any single file or folder from one column to the other in either direction (to initiate an archive or restore). Items can be dropped when the drop target shows a thin dark outline. The drop target may be any directory, subdirectory or the current level of the window (the whole window will outline for the current level).



Important

NOTE: The *drop target outline* is the only indication you will get that a transfer is about to be initiated. Once files have been dropped, you will not get any other indication for several seconds until the system actually decides to start the archive session. Do NOT repeat the drop because nothing happens immediately or you will archive your files twice.



File Manager Drag-and-Drop into Subfolder with Drop Target Outline

Hopefully this is obvious, but it is worth explicitly pointing out that dragging from the Source Directory and dropping on the Tape Directory causes items to be **archived** to tape while dragging from the Tape Directory to the Source Directory causes items to be **restored** from tape.

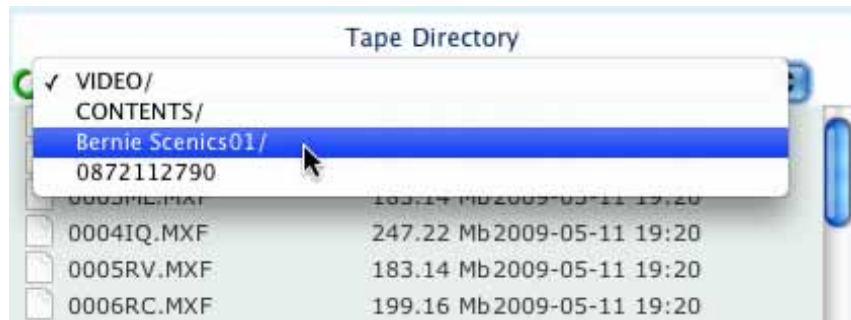
Multiple files can be selected using the shift key – each file/folder you click on with the shift key held down will toggle the item (either add or remove it from the selected group). Drag-and-drop the group upon selection of the last item to be included (don't release and click in the group).

If you need to manage files deep in a directory structure, there is a convenient facility to list only files below any given point – simply drag-and-drop the desired folder onto that column's title bar dropdown:



File Manager Subdirectory Listing

Clicking on the title bar button will show the directory structure above the current point and allow you to pop back up to any level by selecting the desired line as shown in the next figure.



File Manager Subdirectory Structure

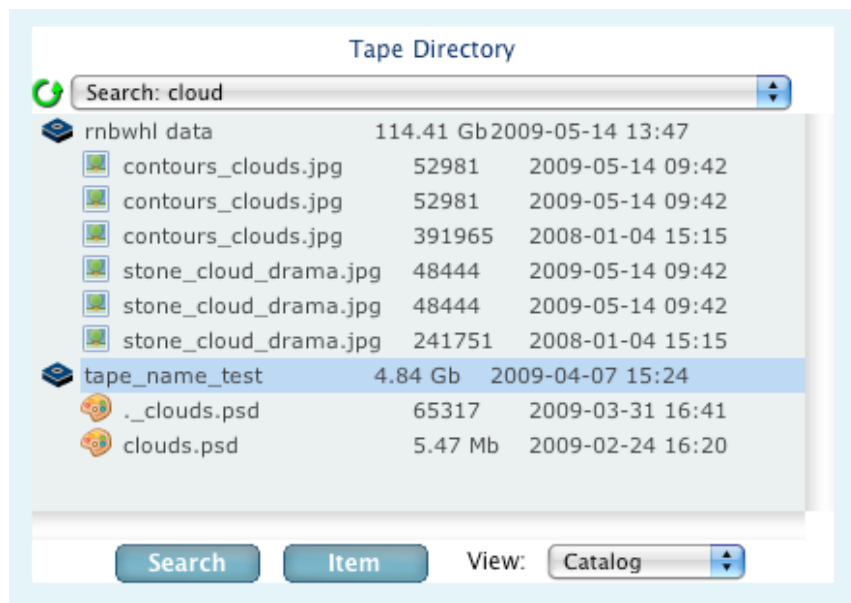
The Search Button

Clicking on the **Search** button at the bottom of the Tape Directory list invokes a search dialog window to allow searching every tape and file the system has ever seen. The search function will search all file names, all tape names, all barcode and all location field text strings. Future releases will allow searches to include other fields.



Search Dialog Window

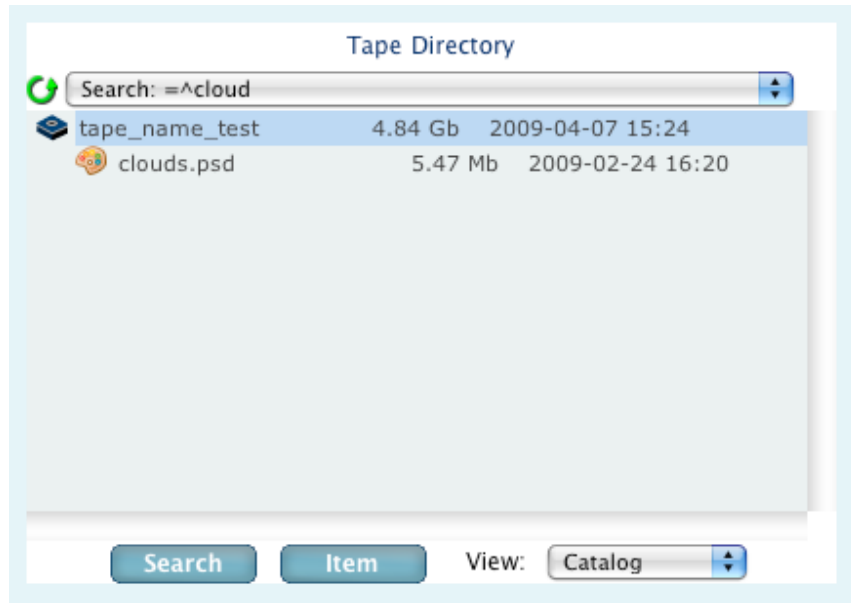
This search is normally a “loose pattern matching” search. That is, it will find any instance where the search term appears – at the beginning, the end or within any part of a word. The following example shows a search for all files containing the word “cloud”



Standard Search Results

If you want to conduct a more restrictive search, you can do what is referred to as a “regular expression” search by preceding your search string with an equals sign (=). Such a search provides a very powerful tool to find any specific text required. Some examples include using a caret (^) to indicate the beginning of a file name, a dollar sign (\$) to indicate the end, and a pipe (|) to indicate a logical OR.

The following example shows a search for all files where the word “cloud” appears only at the beginning of the text string:



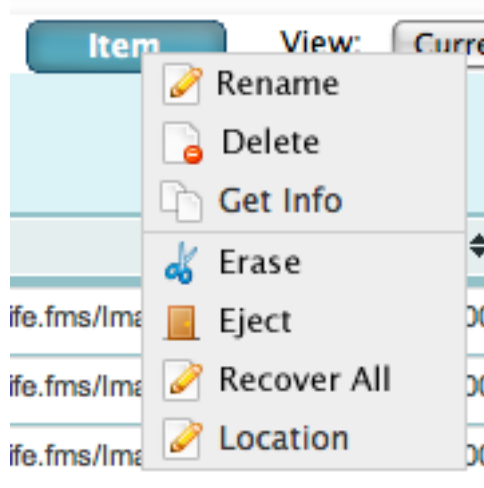
Regular Expression Search Results

A more complete listing of regular expression terms can be found in Appendix B.

The Item Menu

Clicking on the **Item** button at the bottom of the Tape Directory list invokes a popup window to allow a variety of operations to be performed on whatever item is selected in the Tape Directory list above. Note that these functions differ depending upon whether the current selection is a file, an item in the catalog, or nothing selected which means the current tape.

Note that various selections within this popup may be gray as they either don't apply to the currently selected item(s) or may not be available when the system is busy.



The Item Menu Popup

Rename – Rename Tape Volume

Tape: This selection will rename the volume name of the current tape. This will also cause the VTAPE to be renamed to match the new name and will update the listing for the current tape in the Catalog.

File: This selection changes the name of the current tape even if a file is selected – file names cannot be changed on Cache-A A-Series system.

Catalog: This selection is grayed out – Tape names can only be changed for the current tape.

Delete – Delete File

Tape: This selection is grayed out – you cannot delete the current tape.

File: This selection is grayed out – you cannot delete files once archived on tape.

Catalog: This selection will cause the currently selected tape in the catalog to be removed from the tape catalog (grayed out if no tape is selected). This cannot be undone, however, if a removed tape is seen again, it will again be added to the catalog.



Remove Selected Tape from the Catalog Confirm Dialog

Get Info

Tape: This selection is grayed out when nothing is selected in Current Tape view. Use the main menu Tape Information item or select the current tape in the catalog.

File: This selection will cause the information window for the currently selected file to appear (see the File Information window section below).

Catalog: This selection will cause the information window for the selected file or tape (depending on what is selected) to appear. If the current Tape is selected, this is the same as selecting **Tape Information** from the main menu – see the Tape Information section below for details).

File Information Window

The file information window shows all standard Table of Contents information in the catalog for the selected file:



File Information Window

Volume Name

Displays the name of the volume (tape) on which the currently selected file resides

Directory

Displays the full path to the file that is currently selected

Filename

Displays the name of the file that is currently selected

Size

Displays the size of the file that is currently selected

Permissions

Displays the standard Unix-style permissions for the currently selected file in the form *rwXrwxrwx* where the first three letters is read, write and execute permission for the user who owns the file, the next three letters are the same for anyone in the same group as that user and the last three are the same for everyone. For example, “-rw-rw-r--” would indicate the user and their group can read and write the file and everyone can read it.

User

Displays the user or user ID who owns the file

Group

Displays the group or group ID of which the owner is a member

Last Modified

Displays the date and time the file was last modified

Last Accessed

Displays the date and time the file was last accessed

Versions

Appears when there are more than one copy with the currently selected file name – Displays the versions of the currently selected file on the tape. Select the file name of a version to view its File Information.

Erase

Tape (Current Tape or VTAPE): This selection will invoke a confirm dialog to allow erasing (re-initializing) either the current tape or the VTAPE, depending upon which is selected in the Tape Directory View dropdown menu.



Erase / Initialize Current Tape Dialog



Erase VTAPE Confirm Dialog

File: This selection is grayed out – you cannot erase a file.

Catalog: This selection is grayed out – you cannot erase a tape in the catalog (note that you can delete tapes from the catalog – see that section above).

Eject

This selection will cause the system to prepare to eject the current tape by providing a confirm dialog with the option to keep or clear the VTAPE.



Eject Confirmation Dialog

Unless you are planning on using the data contained on the VTAPE, you should select Erase to clear out the VTAPE in preparation for starting with the next tape.

If you decide that you do not in fact want to eject the tape, you can cancel this operation using the close box in the upper right corner.

Recover All

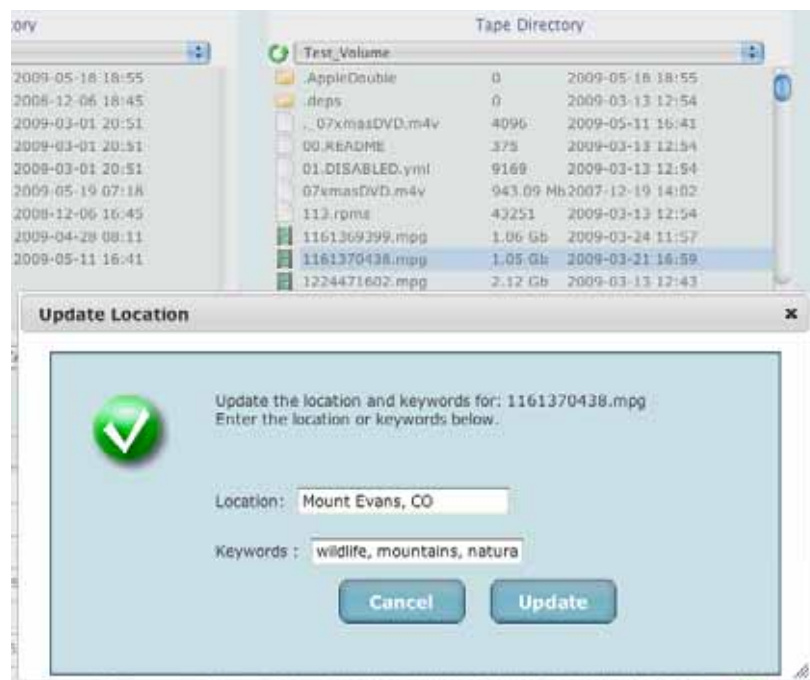
This selection will cause the contents of the entire current tape to be copied to the VTAPE.



Recover Entire Tape Dialog

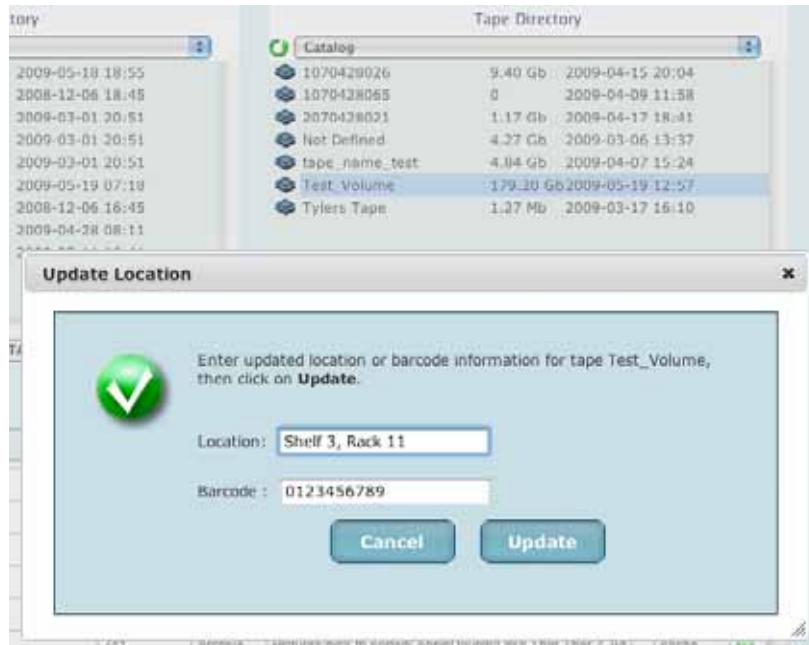
Location

File: This selection will invoke a dialog to allow adding metadata to the current file – a provision is made to record any **Keywords** associated with the file and to identify a **Location** where file was recorded. These are free text fields up to 2³² characters long.



File Location Dialog

Catalog (Tape): This selection will invoke a dialog to allow adding metadata to the selected tape – a provision is made to record any **Barcode** used on the tape and to identify a **Location** where the tape is to be stored. These are free text fields up to 2³² characters long.



Tape Location Dialog

Note: you may use any of these fields to store any text-based metadata you want to associate with a file or tape – these category names are only provided as field identifiers and do not impose restrictions on the use of these fields.

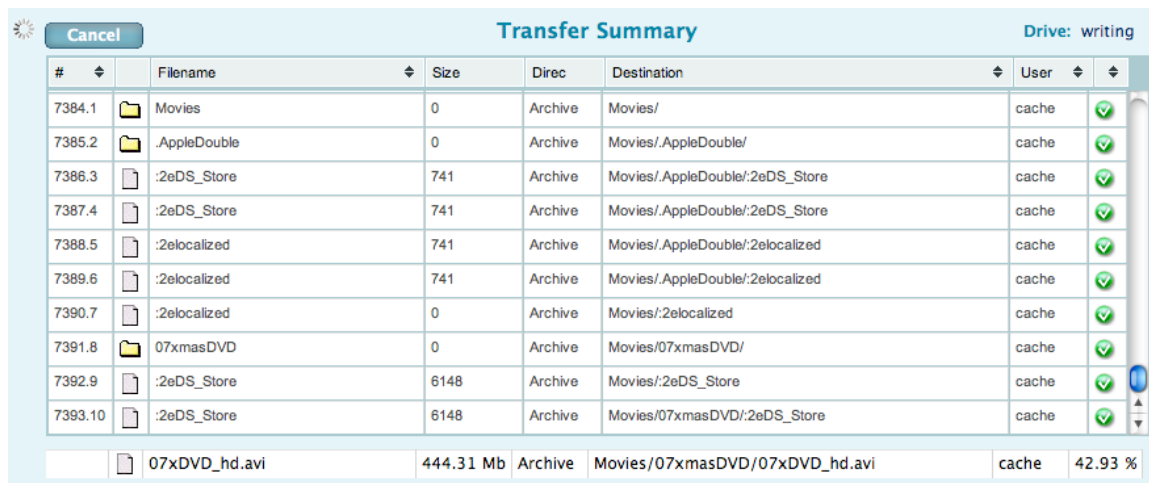


Important

Changing metadata for any tape other than the current tape will cause differences between the tape's own data and the catalog: the tape's own copy of this metadata will be updated the next time that tape is loaded. Note that you can also change Location information for any files on any tape whether loaded for not, this too will be updated upon the next load of the tape containing those files.

The Transfer Summary

The **Transfer Summary** area below the File Manager contains a selection of important information about every file copied on or off the tape as well as information about system activity and a cancel control.



The screenshot shows a window titled "Transfer Summary" with a "Cancel" button and "Drive: writing" status. It contains a table with columns: #, Filename, Size, Direc, Destination, User, and a status column with green checkmarks. The table lists various files and folders being transferred to a "cache" user. At the bottom, a summary row shows "07xDVD_hd.avi" with a size of 444.31 Mb and a progress of 42.93 %.

#	Filename	Size	Direc	Destination	User	
7384.1	Movies	0	Archive	Movies/	cache	✓
7385.2	.AppleDouble	0	Archive	Movies/.AppleDouble/	cache	✓
7386.3	:2eDS_Store	741	Archive	Movies/.AppleDouble/:2eDS_Store	cache	✓
7387.4	:2eDS_Store	741	Archive	Movies/.AppleDouble/:2eDS_Store	cache	✓
7388.5	:2elocalized	741	Archive	Movies/.AppleDouble/:2elocalized	cache	✓
7389.6	:2elocalized	741	Archive	Movies/.AppleDouble/:2elocalized	cache	✓
7390.7	:2elocalized	0	Archive	Movies/:2elocalized	cache	✓
7391.8	07xmasDVD	0	Archive	Movies/07xmasDVD/	cache	✓
7392.9	:2eDS_Store	6148	Archive	Movies/:2eDS_Store	cache	✓
7393.10	:2eDS_Store	6148	Archive	Movies/07xmasDVD/:2eDS_Store	cache	✓
	07xDVD_hd.avi	444.31 Mb	Archive	Movies/07xmasDVD/07xDVD_hd.avi	cache	42.93 %

The Transfer Summary Area

As transfers may contain far too many files for your browser and/or client to deal with in a web interface, the scrolling summary list truncates at the last approximately 2000 files. You can always see the full list of files in the Diagnostic Logs > Transfer tab (can also take a long time to view) or by opening the “TransferLog.txt” on the Cache-A share with an appropriate text tool.

For maximum transfer performance you may want to point your browser at a different page or close the window altogether to save your Client and Appliance’s CPU cycles for archiving. You can always watch the front panel disk activity light to monitor archive completion.

Transfer Activity Indicator

A rotating transfer activity indicator will appear at the upper left corner of the transfer summary area whenever the system is actively engaged in copying data on or off of tape.



Warning

If this indicator appears and is rotating, do not attempt to eject the tape, turn off the system or to disconnect the network. Doing so will interrupt your transfer and result in incomplete data and potentially corrupt files and or tapes.

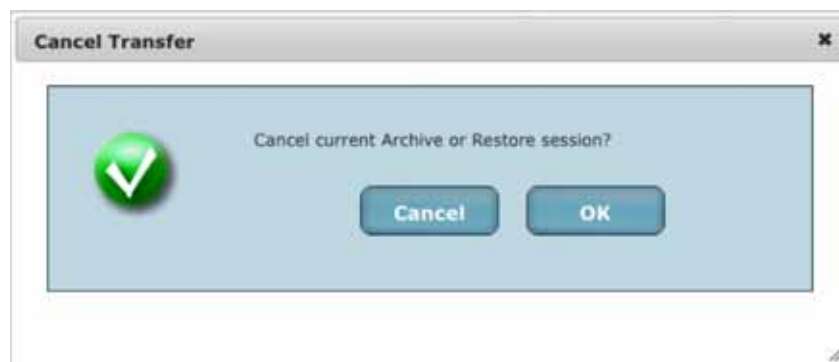


Important

If this indicator appears and is not rotating, your browser may not be correctly updating the display of this page – select the browser refresh button if this occurs.

Cancel Button

The **Cancel** button at the upper left corner of the summary list is the correct method for terminating any transfer in the most orderly fashion. Once this button has been clicked and the Cancel operation has been confirmed in the resulting dialog, a termination process is invoked which will complete the current file transfer and abandon transfers of any other cued files in the session.



Cancel Confirmation Dialog



Important

If you have clicked on the Cancel button, you must allow the system to complete its current operation by noting the activity indicator.



Warning

A Cancel will always result in one or more files not getting successfully archived to tape or restored. Be aware that you will need to redo the operation if you want to be sure all files are present.

You cannot cancel an archive if any user is still copying files to the VTape as each new file will restart the archive process.

Drive Status

The **Drive Status** item displays the current state of the tape drive – this is the first place to check what activity is ongoing if in doubt. Possible messages include

- **no_tape** – the drive does not detect the presence of a loaded tape

- **pending** – the system is waiting for internal activity to complete before reading or writing to/from the drive
- **seeking** – the drive is shuttling to find data, the table of contents or the end of data to begin writing
- **ejecting** – the drive is ejecting the current tape
- **loading** – the drive is currently loading a tape
- **writing** – the drive is writing data to the tape
- **reading** – the drive is reading data from the tape

The Transfer List

The **Transfer List** keeps track of every file archived or restored since the current tape was loaded. When the tape is ejected, the transfer list is cleared, however the system retains logs for the last three tapes it has seen (see System Maintenance for information about how these past logs can be accessed).

In addition to listing file transfers, the list includes lines containing descriptions of when archive or restore sessions started and ended and a summary file count and transfer speed for each session.

4370		Session ended: 06/02/09 10:50:21 pm		Archive			
4371		Total: 615	25.95 Gb	Archive	Transfer Rate: 53040.16 kb/sec;		

Transfer Session Summary

A Session is created for each batch of files a user groups together when initiating a transfer (regardless of what method was used to initiate that transfer). The most efficient use of tape and best performance will be obtained by dropping many files at a time when archiving. If small groups are dropped close enough in time, the system may automatically group them.

The **Transfer List** in the File Manager page is automatically trimmed to only hold the last approximately 2000 events to keep the browser from consuming too much memory and slowing down. The complete transfer list is available in the Diagnostic Logs page under the Transfer Log tab or on the network share in a file called "TransferLog.txt (if any errors occurred, there will also be a file called "ErrorLog.txt containing only the problem events).





The following information describes the information displayed under each of these column headings:

#

The number (#) column displays a two-part number separated by a decimal point of the form XXX.YYY. The first number XXX identifies the line number of the event, starting a count from the first time anything was done to the current tape. The second number YYY identifies the number of the event within the current session. These numbers continue counting up until a tape is ejected and the list is cleared.

Kind

The **Kind** column indicates what kind of information that line is displaying:

-  File
-  Folder
-  Session indicator –or–
-  Transfer Information

Filename

The **Filename** column displays the name of the file or folder that has been transferred. Session and file information will also appear in this column.

Size

The **Size** column indicates the file size in File lines or the total transfer size in the Transfer Information lines

Direc

The Direction (**Direc**) column indicates for each line whether it is denoting an archive operation to tape or a restore operation from tape

Destination



The **Destination** column indicates the complete path to the destination where the file or folder was saved.

User

The **User** column indicates the name of the owner of the transfer. This will be the user currently logged in on the web session if the transfer was initiated from the File Manager interface. If a user elsewhere on the network initiated the transfer, the user's numerical ID is displayed.

Status

The Status column indicates whether that line was:

-  Successful – or –
-  Had Errors

3133.31	Parent	741	Archive	AppleDouble/Parent	cache	✓
3134	Session ended: 06/01/09 6:34:09 pm		Archive			✓
3135	Total: 3124 Errors: 0		69.90 Gb	Archive	Transfer Rate: 35324.46 kb/sec.	✗

Transfer List Summary Reporting Errors

If the list of files within any session of your transfer summary contains any errors, the summary line will also show that errors occurred. If this happened, you should be aware that the files so indicated may not have been successfully archived and may need to be re-archived once the problem that caused the error is addressed.

The Pending Transfer Bar

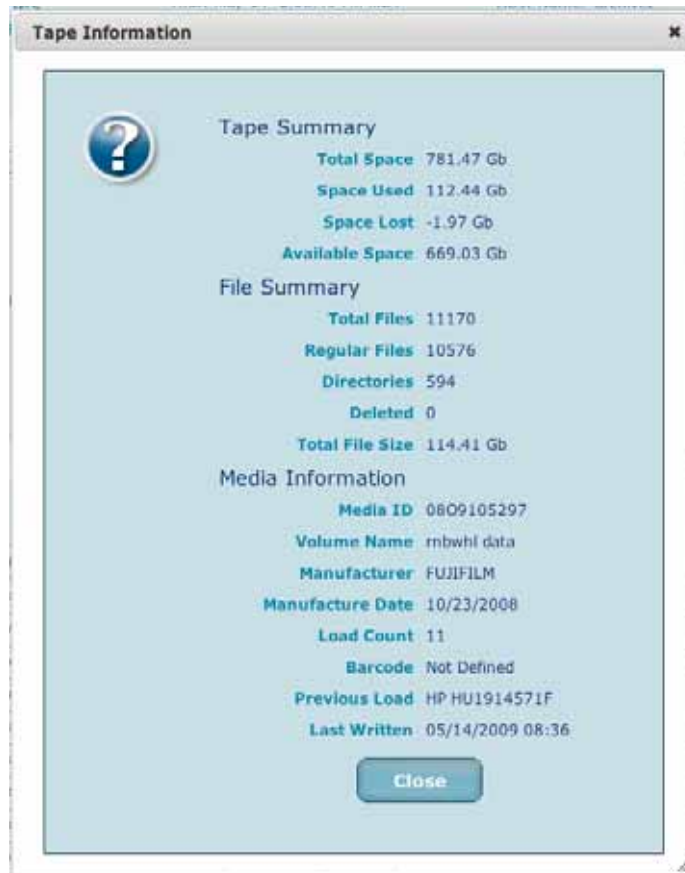
When the system is actively transferring files on or off of tape, the **Pending Transfer Bar** will appear below the Transfer List and display information about the transfer of that particular file. The columns contain the same information as noted above except for the Status cell, which will indicate what percentage of that file has been transferred so far.

4392.20	MHD_PD1_50031_HD.mov	741	Archive	NAB 2008 demo files/AppleDouble/MHD_PD1_50031_HD.mov	cache	✓
4393.21	MHD_PD1_50031_HD.mov	741	Archive	NAB 2008 demo files/AppleDouble/MHD_PD1_50031_HD.mov	cache	✓
	MHD_PA1_50068_h264.mov	41.10 Mb	Archive	NAB 2008 demo files/MHD_PA1_50068_h264.mov	cache	92.81 %

The Pending Transfer Bar

Tape Information

The **Tape Information** menu item invokes a popup window that provides a comprehensive listing of information about the currently loaded tape or about any selected tape in the tape Catalog. This listing shows all of the data important to users and which is maintained in the cartridge Memory Information Chip (aka. the “MIC” chip or the “CM” cartridge memory).



Tape Information Display Window

Tape Summary

Total Space

Displays the total capacity of the tape in Gigabytes.

Space Used

Displays the total number of Gigabytes consumed on the tape with files, folders, TOCs (table of contents), and lost space.

Space Lost

Displays how much space is lost or gained (negative number). Space on tapes is lost if bad blocks have been identified and marked and wherever writing had to stop and restart. Space is gained whenever data losslessly compresses (see Lossless Compression section for more information).

Available Space

Displays the result of Total Space minus Space Used.

File Summary

Total Files

Displays the total number of directory entries (files and folders) on tape.

Regular Files

Displays the number of files on tape.

Directories

Displays the number of directories on tape.

Deleted

Displays the number of files and folders that have been moved to the trash.

Total File Size

Displays the total size of all files on tape not taking into consideration any lossless compression.

Media Information

Media ID

Displays the hard-coded Media ID of the tape. This ID is physically printed on the bottom of the cartridge and is permanently stored in the cartridge memory.

Volume Name

Displays the Name of the volume that represents the tape. By default this is the same value as the Media ID, but can be changed by the user with the Item > Rename command or by renaming the VTAPE share on any client computer.

Manufacturer

Displays the manufacturer of the tape and cartridge.

Manufacture Date

Displays the date the cartridge was manufactured.

Load Count

Displays the total number of times the tape has been inserted into any LTO drive.

Barcode

Displays the assigned Barcode value for the tape as entered by the user with the Item > Location command.

Previous Load

Displays the serial number identification of the hardware device which last read the tape

Last Written

Displays the system time of the device that had the tape loaded when it was last written.

System Status

The **System Status** page displays information about the health of various subsystems, information about the VTAPE and Network Status.

The screenshot shows the 'System Status' page of a CACHE-A LTO-4A-Series Archive Appliance. The page header includes the CACHE-A logo, the appliance name, the date and time (Thur, May 14 2:39:41 PM MDT), and system information (Host Name: archive2, Link: 100 Mb/s, User: cache, Tape Type: LTO-4). The main content area is divided into two sections: 'Status Summary' and 'Network Status'. The 'Status Summary' section shows the 'Health Status' of various components: Drive (Healthy), Media (Healthy), Server (Healthy), and VTape (Healthy). It also displays storage statistics: Total Size: 900.43 Gb, Remaining: 845.72 Gb, and Used: 8.97 Gb (2%). The 'Network Status' section shows: Link Speed: 100 Mb/s, Hostname: archive2, Configuration: dhcp, IP Address: 192.168.0.107, Netmask: 255.255.255.0, Gateway: 192.168.0.1, and Nameserver: 192.168.0.1.

System Status Page

Health Status

The Health Status section provides a central location to quickly advise users if there is anything wrong with any areas within the archive appliance system. Each of the first 3 line items is a reflection of the main status indicators on the web page header and additional information is displayed in the event of any problems.

Drive

Reports the status of the LTO4 Tape Drive

Media

Reports the status of the currently inserted Tape

Server

Reports the status of the archive appliance software and CPU

VTAPE

Reports the status of the virtual tape file system

Total Size

Reports the total size of the virtual tape

Remaining

Reports how much of the space on the virtual tape is available

Used

Reports how much of the space on the virtual tape has been consumed with data

Network Status

The Network Status section provides a summary of the information about how the archive appliance is connected. These values are normally set by the user in the Network Settings page, however they may have been set using other Linux facilities from the system monitor or a remote login shell. This area reports actual settings currently in play on the system.

Link Speed

Reports the Ethernet connection speed detected by the system. For optimum performance this display should show 1000 Mb/s for Gigabit Ethernet connection speed.

Hostname

Reports the configured hostname for this system.

Configuration

Reports whether the system is obtaining its IP address from a server or router (DHCP) or if the IP address is Manually assigned

IP Address

Reports the IP address used to communicate with this archive appliance

Netmask

Reports the Network mask used with this archive appliance

Gateway

Reports the Gateway used with this archive appliance

Nameserver

Reports the Nameserver used with this archive appliance

Versions

The **Versions** page shows a variety of critical information about the software and hardware in the archive appliance serving this web page. When contacting technical support, please refer to the information on this page.

The screenshot displays the web interface for a CACHE-A LTO-4A-Series Archive Appliance. At the top, the logo 'CACHE-A' is on the left, followed by 'LTO-4A-Series Archive Appliance'. The top right shows the date and time 'Thur. May 14 2:40:41 PM MDT', host name 'archive2', user 'cache', link speed 'Link: 100 Mb/s', and tape type 'Tape Type: LTO-4'. Below the top bar is a navigation menu with 'User Menu' and 'Admin Menu' sections. The 'User Menu' includes 'File Manager', 'Tape Information', 'System Status', 'Version' (highlighted), 'Diagnostic Logs', and 'Log Out Cache'. The 'Admin Menu' includes 'Mount Manager', 'Backup Schedules', 'Network Settings', 'User Management', 'Date & Time', 'System Tools', and 'Shutdown'. The main content area is titled 'System Version' and contains the following information:

Version:	1.0
Release Date:	March 20, 2009
Serial Number:	CA30101034
System Information:	Memory : 1280 MB CPU : 1.2 GHz Intel(R) Celeron(R) CPU E1200 @ 1.60GHz (Level: 13) Swap Space : 2000 MB HBA Card: LSI Logic / Symbios Logic SAS1064ET PCI-Express Fusion-MPT SAS (rev 08) Ethernet NIC MAC Address: 00:1C:C0:70:F1:87

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Versions Page

Version

Reports the software release version currently installed on this system.

Release Date

Reports the Release Date on which this version was created.

Serial Number

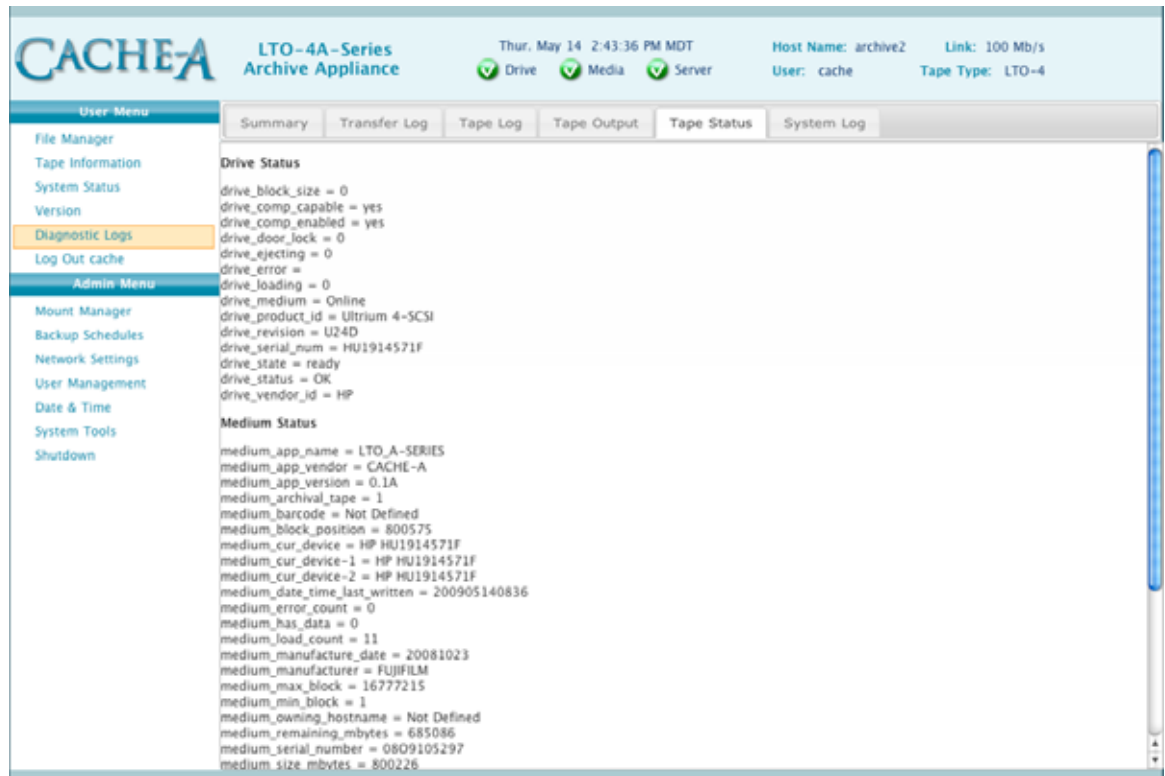
Reports the unique Serial Number used to identify this archive appliance. This number will be needed by support in order to contact this system.

System Information

Reports a variety of information about the hardware used in this archive appliance.

Diagnostic Logs

The Diagnostic Logs page provides access to a range of system logging information that will be useful in diagnosing any problems that may arise.



The screenshot shows the CACHE-A LTO-4A-Series Archive Appliance web interface. The top header displays the CACHE-A logo, the appliance name, the date and time (Thur, May 14 2:43:36 PM MDT), and system status indicators for Drive, Media, and Server. The left sidebar contains a 'User Menu' with options like File Manager, Tape Information, System Status, Version, Diagnostic Logs (highlighted), and Log Out cache, and an 'Admin Menu' with options like Mount Manager, Backup Schedules, Network Settings, User Management, Date & Time, System Tools, and Shutdown. The main content area shows the 'Tape Status' tab selected, displaying detailed status information for the drive and the current tape.

```
Drive Status
drive_block_size = 0
drive_comp_capable = yes
drive_comp_enabled = yes
drive_door_lock = 0
drive_ejecting = 0
drive_error = 0
drive_loading = 0
drive_medium = Online
drive_product_id = Ultrium 4-SCSI
drive_revision = U24D
drive_serial_num = HU1914571F
drive_state = ready
drive_status = OK
drive_vendor_id = HP

Medium Status
medium_app_name = LTO_A-SERIES
medium_app_vendor = CACHE-A
medium_app_version = 0.1A
medium_archival_tape = 1
medium_barcode = Not Defined
medium_block_position = 800575
medium_cur_device = HP HU1914571F
medium_cur_device-1 = HP HU1914571F
medium_cur_device-2 = HP HU1914571F
medium_date_time_last_written = 200905140836
medium_error_count = 0
medium_has_data = 0
medium_load_count = 11
medium_manufacture_date = 20081023
medium_manufacturer = FUJIFILM
medium_max_block = 16777215
medium_min_block = 1
medium_owning_hostname = Not Defined
medium_remaining_mbytes = 685086
medium_serial_number = 0809105297
medium size.mbytes = 800226
```

Diagnostic Logs page – Tape Status Tab



**This may
take a few
minutes**

Depending upon how much information is in these logs, these tabs may not appear very quickly and will indicate that information is being gathered by the word “*Loading...*” appearing on the selected tab.

Summary

The summary page allows you to create a compressed image of all logs on the system and to download this image to your client computer for emailing to Cache-A technical support.

These logs can be normally viewed by support directly using the Support Connect technology enabled under **System Tools** (see below). This facility is provided for circumstances when support cannot get to your machine either due to network or time constraints.

Transfer Log

Reports a log of all transfers since the current tape was loaded. This list contains the same information as the **File Manager > Transfer List**, however is not truncated and may include hundreds of thousands of entries. In the event this is a long list, it may take some time to load.

Tape Log

Reports a log of Tape information

Tape Output

Reports a log of Tape output

Tape Status

Reports a log of Tape status

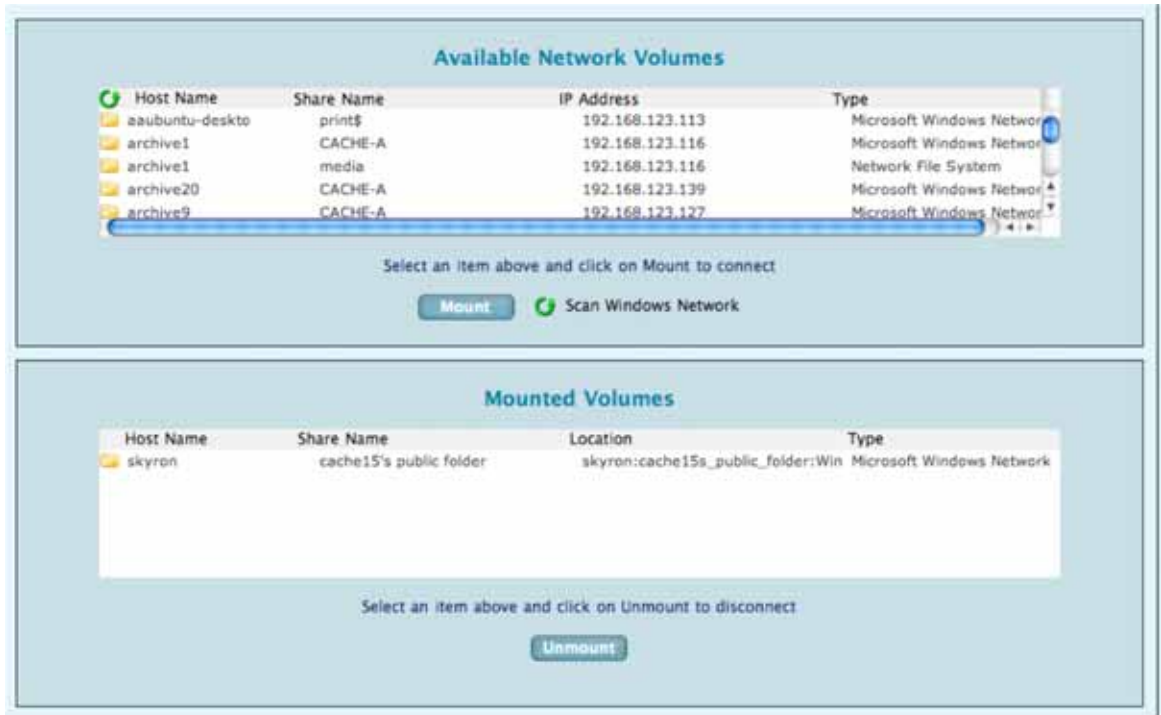
System Log

Reports a log of system functions and status

Mount Manager


The **Mount Manager** provides a tool to enable the archive appliance to mount shares that are available on your network. Mounting network shares allows you to archive or restore data using the **File Manager** page; shared volumes are available in the dropdown menu at the bottom of the **Source Directory** list, making any files therein available for drag-and-drop operations. Mounting network shares also allows you to schedule backups of these shares using the **Backup Manager** described below.

When you open this page by clicking on the **Mount Manager** item in the Main Menu, the **Available Network Volumes** list automatically rescans to locate all publically browseable shares.



The Mount Manager Screen

Note shares shown include Unix/Linux NFS systems running zeroconf and advertised windows SMB shares (afp shares are not yet available as of this revision).

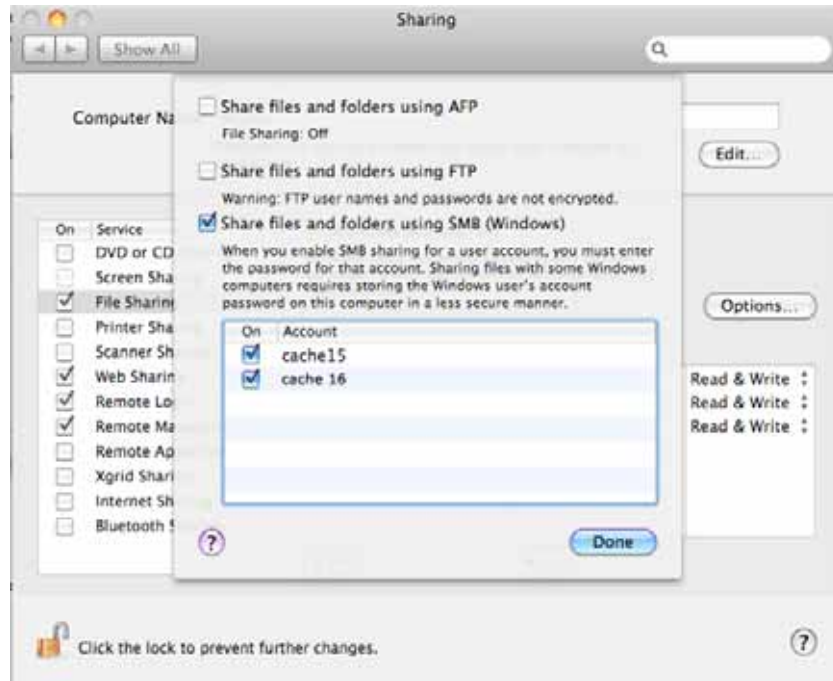
If shares have been added to the network, you can cause this list to refresh manually by clicking on the  refresh button in the upper left corner.



**This may
take a few
minutes**

Because Windows share scans can take a long time, especially on networks with a large number of PCs, there is a separate refresh button to allow you to cause the system to scan for Windows XP shares. Note that Vista shares will not appear – you will have to configure Vista computers to use Windows XP style sharing.

Even though afp volumes are not yet available, Macintosh computers can be mounted with this tool by configuring the system preferences to share via SMB as shown in the following figure.



SMB Sharing from a Mac OS X system

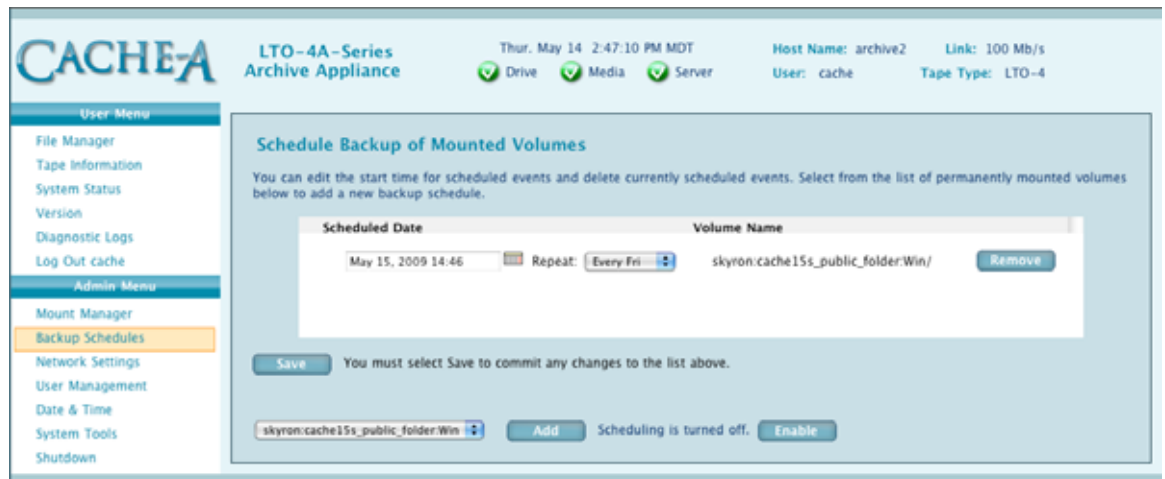
Once the **Available Network Volumes** list has completely updated, to actually mount any volume, click on the desired line to select that volume for mounting and then click on the **Mount** button.

Successfully mounted volumes will disappear from the **Available Network Volumes** list and show as a list item in the **Mounted Volumes** list. Volumes appearing in this list are now available for manual operations as noted above in the dropdown menu at the bottom of the Source Directory list and for automated operations in the Backup Manager dropdown.

If you are only going to use a mounted share for Scheduled Backups, it is a good idea to check that they are correctly mounted by selecting them in the File Manager > Source Directory dropdown menu and reviewing their contents listing.

Backup Schedules

The **Backup Schedules** page provides a set of tools to allow selecting any mounted volume to be added to the schedule list and to set a schedule for that volume to automatically be archived to whatever tape is inserted at the scheduled time.



The Backup Schedule Screen

To schedule a backup, select the desired volume from the dropdown menu at the bottom of the page, and click on the **Add** button. The selected volume will appear in the backup schedule list above.

For each volume in the list, determine a start date by clicking on the calendar and navigating to the desired date and time. Select a repeat option from the **Repeat** dropdown menu. After making date and repeat selections or after changing any previous programmed selection, click on the **Save** button to preserve your settings.

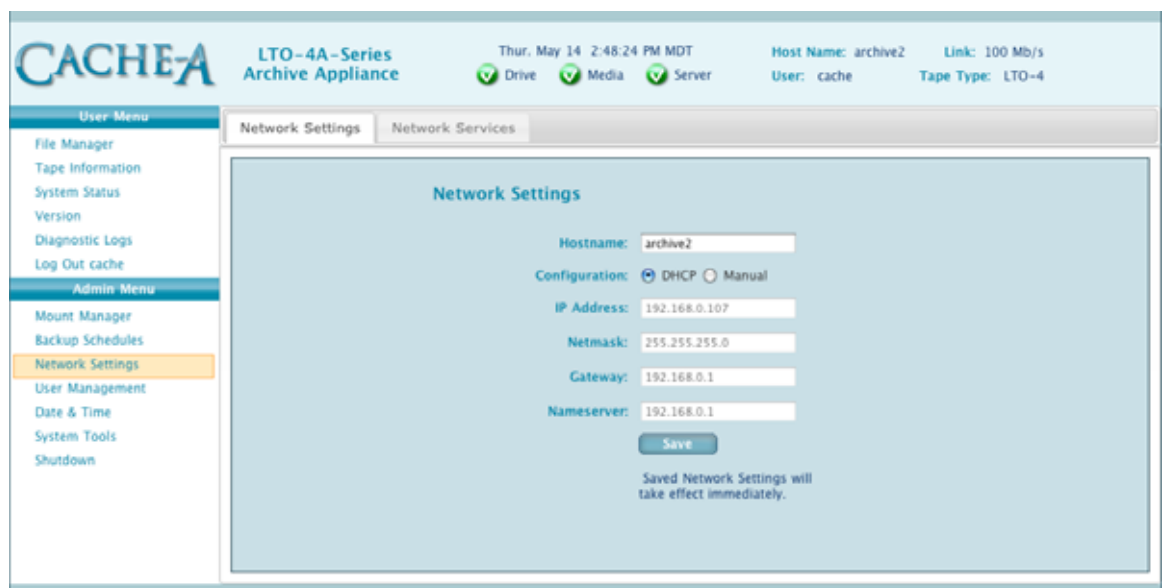
Backup schedules can be enabled or disabled all at once by clicking on the **Enable/Disable** button in the lower right. Individual scheduled items can be deleted by clicking on the appropriate line item **Remove** button.

Network Settings

The Network Settings page provides tools to configure normal Ethernet network configurations as well as to enable or disable the variety of network services available on Cache-A archive appliances.

Network Settings Tab

Standard network configuration items can be set from this page.



Network Settings Screen

Hostname

Provides a type-in box to view or change the configured hostname for this system.

Configuration

Provides a pair of radio buttons to view or change the system IP address setting from DHCP (obtain from a server or router) or Manual (to allow the IP address to be user assigned)

IP Address

Provides a type-in box to view or change the IP address used to communicate with this archive appliance

Netmask

Provides a type-in box to view or change the Network mask used with this archive appliance

Gateway

Provides a type-in box to view or change the Gateway used with this archive appliance

Nameserver

Provides a type-in box to view or change the Nameserver used with this archive appliance



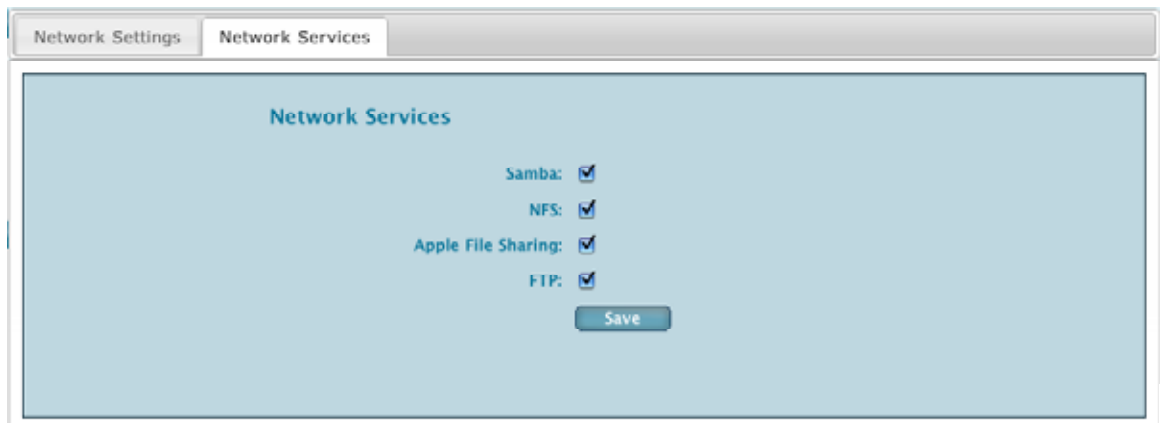
Warning

User setting the IP address through this page affects only the *currently connected* Ethernet port and you must continue to use the same port to access the system by your assigned IP address. Failure to use the same port when powering the system on may result in lost communications.

Additional control over IP settings and/or resetting lost IP addresses can be accomplished through the Maintenance Terminal tools (see that section for more information).

Network Services Tab

The Network Services tab allows you to select what services are available for contacting this Cache-A archive appliance.



Network Settings Screen – Network Services Tab

Samba

Checking this box causes the system to advertise and allow mounting the cache-a share as an SMB/CIFS (a.k.a. Samba or Windows share).

NFS

Checking this box causes the system to advertise and allow mounting the cache-a share as a Unix/Linux Network File System (NFS) share.

Apple File Sharing

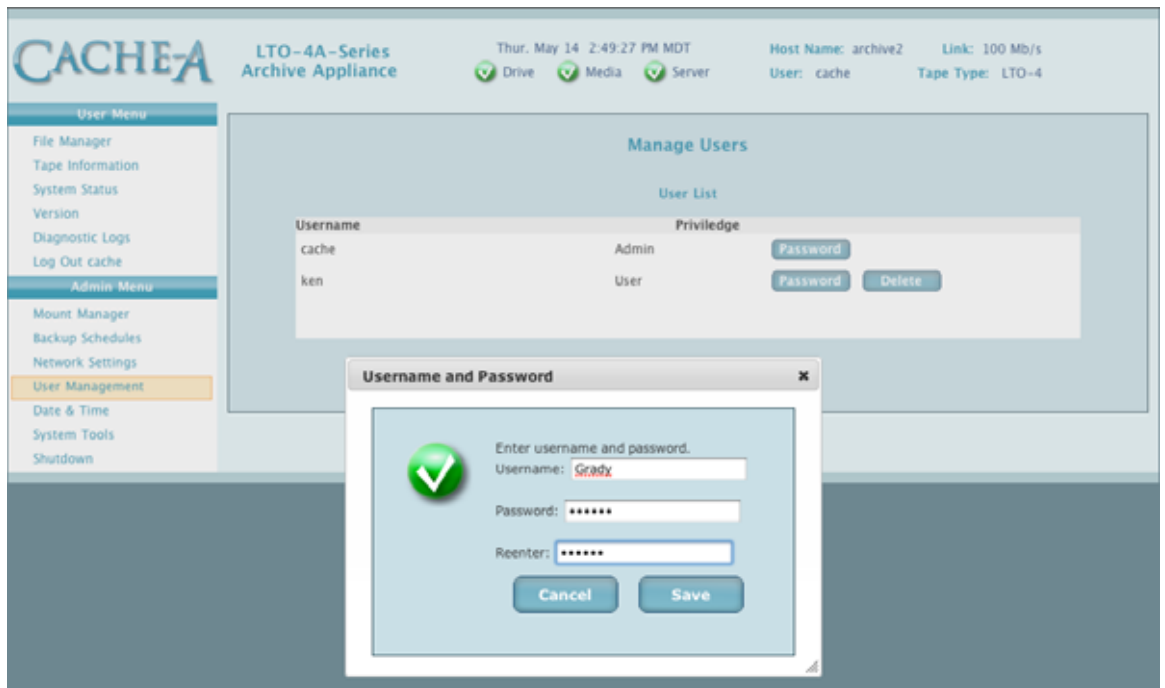
Checking this box causes the system to advertise and allow mounting the cache-a share as an Apple File Protocol (afp) share.

FTP

Checking this box turns on the internal vsftpd server and allowing users to copy content to the cache-a share with any FTP client.

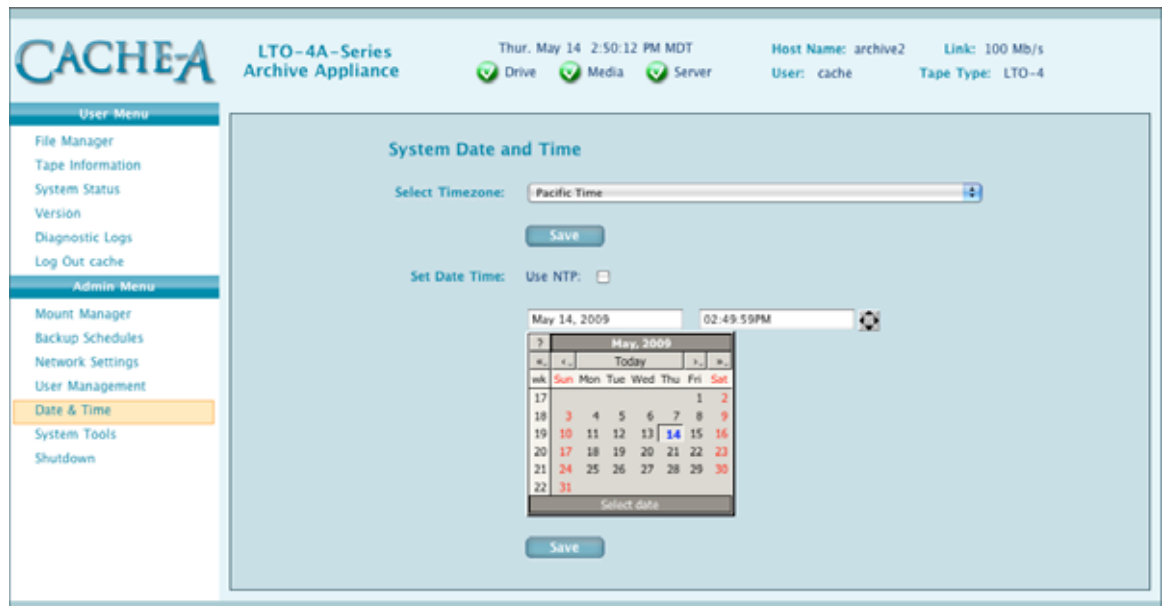
User Management

The **User Management** page allows any administrator level user to add or remove either regular or admin level users.



Date & Time

The **Date & Time** page allows you to configure if the date and time are set automatically via a network time server (NTP) and what time-zone to use for that, or to manually set a time and date.



Select your desired time zone in the **Select Timezone** dropdown menu and then select the **Save** button – this will enable the system to properly track and update system time.

If your system has access to the Internet, you should select the **Use NTP** checkbox to keep the system time automatically correctly set.

If you do not have Internet access, uncheck that box and manually set your time and date using the controls provided.

A reboot is required after changing and saving any settings on this page in order for them to take effect.

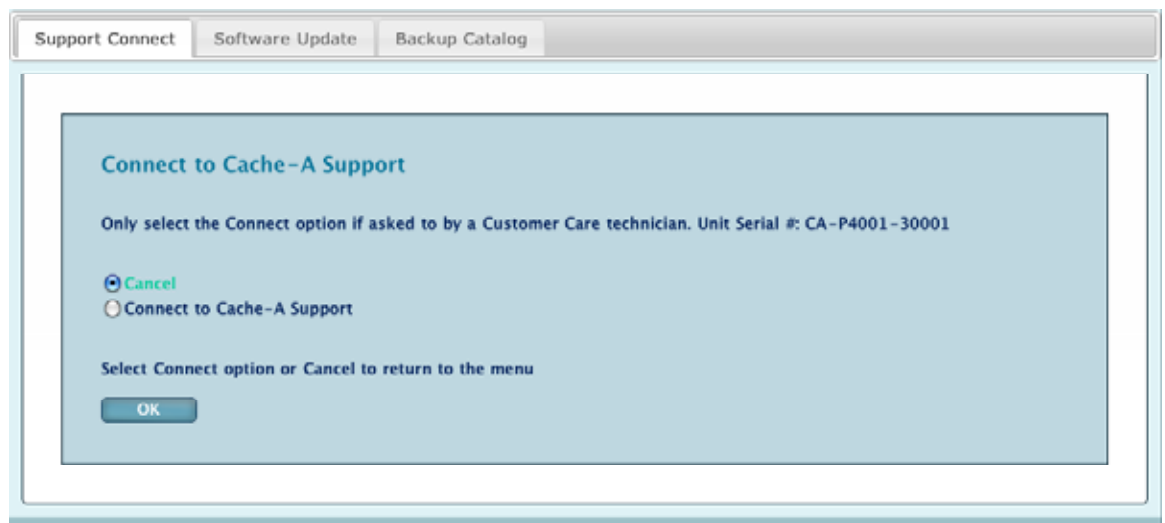
System Tools

The **System Tools** page provides service, backup, and settings options for Cache-A archive appliances.

Support Connect Tab

This tab allows you to make the appliance visible to Cache-A support. As long as your network is attached to the Internet, enabling this feature permits this archive appliance to create a VPN (Virtual Private Network) back to Cache-A's support server and permits a support technician to provide a variety of services including:

- Checking current system status and activity
- Making logs available for review and diagnosis
- Updating software on your system
- Enabling options and or features
- Restoring damaged tapes
- Restoring Catalog backups



Support Connect Tab

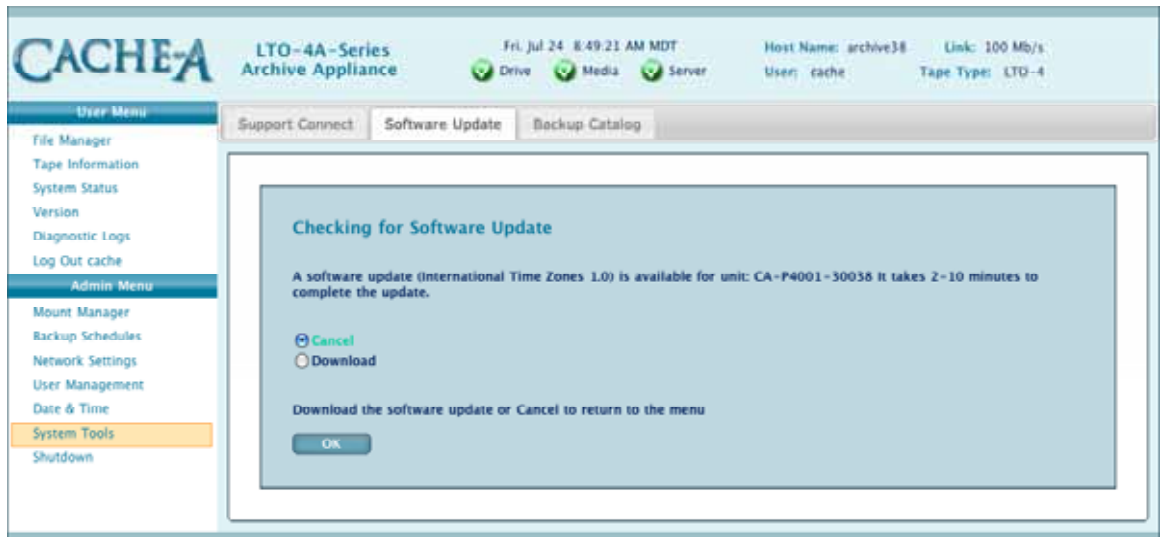
To enable Support Connect, select the **Connect to Cache-A Support** radio button and click on the **OK** button.

Note: the next time your system is rebooted, Support Connect is automatically disabled. Cache-A technicians will usually reboot for you when they complete their activities.

Software Update Tab

From time to time, Cache-A may have optional or purchased updates available. These updates may be for your specific serial number or for many or all archive appliances. As long as your product serial number is registered, you will receive an email if an update is available.

When this occurs, you simply have to visit this tab of the System Tools page to view any scheduled update and to enable a download at any time.



Software Update Tab

To download a software update, select the **Download** radio button and click on the **OK** button.

Backup Catalog Tab

This tab provides a tool for you to backup your Catalog of tape TOCs. This protects the system record of every tape currently in the Catalog and all the metadata associated with every file and tape.

When this function is initiated, the entire Catalog is written to a file on the VTAPE. If a tape is inserted, that file will also be written to that tape – you should note which tape contains the most current backup of your Catalog.

Note that you can also or alternatively take the copy of the Catalog on VTAPE and back it up anywhere else on your network or direct attached storage (i.e. a USB drive) if you prefer to do so. Simply use the same means described elsewhere in this manual for moving VTAPE data to a network share, to your client computer or to direct attached storage.



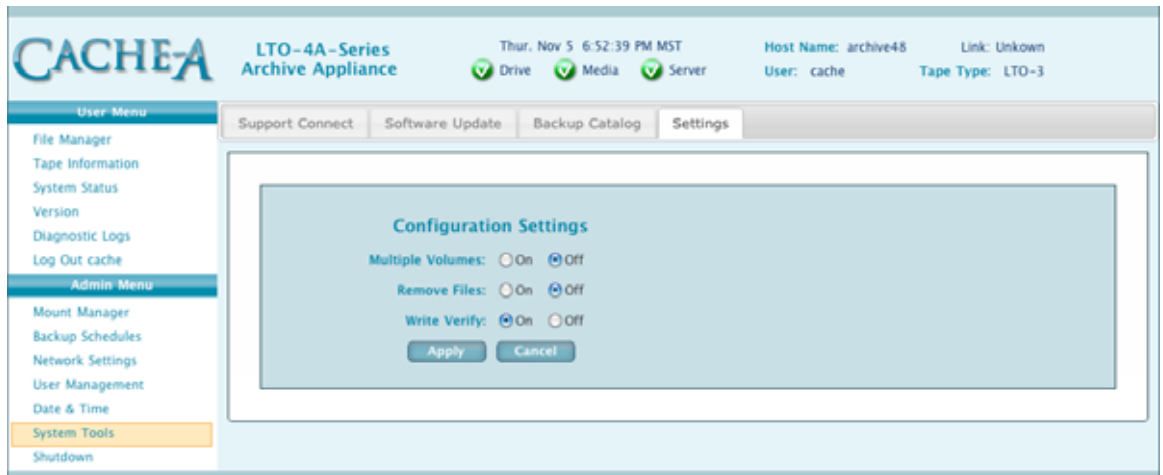
Backup Catalog Tab

Initiate the Backup Catalog function by selecting the **Backup** radio button and clicking on the **OK** button.

Settings Tab

Cache-A version 1.1 introduces two completely new capabilities to our archive appliances.

These capabilities are accessed from the **Settings** tab of the **System Tools** page of the internal web site as shown in the following screen:



System Tools > Settings Tab

The first new feature is the ability to span data sets larger than 800GB across two or more tapes that comprise a “multiple volume” set. We refer to this capability as tape spanning and access it through the “Multiple Volumes” selection.

The second new feature is the ability to automatically remove files from the VTAPE after each one is archived to tape, allowing large data sets to be archived to multiple tapes without requiring user intervention to manage the VTAPE space. We refer to this capability as Auto VTAPE Management and access it through the “Remove Files” selection.

Multiple Volumes

Tape spanning is easy to use but requires the user to keep the multiple volumes of a spanned archive (referred to as a “tape set”) together and organized by number within the set. This feature is turned off by default as, when on, you will end up with an incomplete archive if you do not have a fresh tape to insert when needed.

When “Multiple Volumes” is turned **Off**, users must manually keep track of how much data is on tape using the Tape Info dialog

and assure that each archive session will fit within the remaining available space.

When “Multiple Volumes” is turned **On** the system will continue any archive session across as many tapes as needed. Once the current tape has been filled, the system ejects the current tape and the user is prompted to insert a new one:



User prompt to insert a new tape

Archiving continues until all cued files have been written to tape, no matter how many tapes this takes. Note that the Table of Contents (TOC) is still written only at the End of Data so is only on the last tape in the set.

Tape Sets are identified by the volume name of the first tape in the set. Each tape in the set gets that volume name appended with an underscore and the number of that tape within the set. For example, if the first tape's name was 1234567890 then the 3rd tape within that set will get the volume name 1234567890_3.

Important points to note about spanning tapes include:

- If you are going to use a custom volume name with tape sets, you must assign that name before spanning to the next tape to assure tape set naming consistency.
- The VTAPE will get the base name of the first tape and will not change as additional tapes are added to the set.
- Tapes that were not created with Multiple Volumes **On**, but are not full, can become part of a tape set by enabling this feature and then adding content as desired.
- Tapes within tape sets that have been filled up are automatically write-protected (regardless of the physical protect tab setting) and it is only possible to restore from them or erase them.

- The system catalog will show the contents of each individual tape in the set by its underscore-numbered name. If you are no longer using a tape set, you must individually delete every tape from the set in the catalog – you should not keep a subset and expect the system to restore from them.
- Individual files can span across tape boundaries and thus those files will appear in the catalog entry associated with the tape on which it starts, but the following tape would also be needed to restore that file. On such a restore, the user would be prompted to insert the next tape in the set when needed.
- If you are doing a restore and are prompted for a tape, insert the requested volume – if you insert the wrong one, the system will reject it and request the tape it needs again. If you fail to insert the correct tape 3 times, the restore will abort.

If you need to have a Cache-A appliance learn a tape set that it has not seen before, you only need to insert the last tape in the set. If you insert any other tape from a tape set that has not been seen, you will be prompted to insert the last tape so that the system can access the tape set's TOCs.

Automatic VTAPE Management

“Remove Files” is the ability to automatically remove files from the VTAPE after each one is archived to tape, allowing large data sets to be archived to multiple tapes without requiring user intervention to manage the VTAPE space. As users frequently want to use the contents of the VTAPE for additional purposes, Remove Files is turned off by default.

When “Remove Files” is turned **Off**, users must manually keep track of how much data is on the VTAPE using the System Status page or checking the mounted share from a client computer and assure that there is room on the VTAPE.

When “Remove Files” is turned **On** the system will delete from the VTAPE area of the share each individual file after it has been successfully archived to tape.

It is a good idea to occasionally monitor the VTAPE capacity using the System Status page as there are circumstances where

files can be left undeleted even after successful archive, causing the VTAPE to fill up.

Write Verify

“Write Verify” is an automatic process conducted at the completion of writing each archive session. By default, this capability is set to On and causes the system to traverse the entire list of files archived within each session comparing that list to the source list, and to report any discrepancies.

Users may turn Write Verify Off to save time at the end of archiving sessions.

We recommend that this setting remain On.

Chapter 5: Pro-Cache Unique Features

The Pro-Cache model offers a number of additional capabilities over the Prime-Cache model. These features are covered in this chapter.

Pro-Cache Direct Attached Storage Interfaces

Pro-Cache expands the capability to direct-attach mass storage devices with the addition of ExpressCard, eSATA and SAS interfaces. These interface physical locations are shown in the following Hardware Reference section.

Nominally, any mass storage device connected to any of these interfaces will be seen by the system software and made available for archiving operations. There are restrictions to this as follows:

eSATA Interface

The eSATA interface (or external serial ATA computer bus) is intended for connecting to mass storage devices such as hard disk drives. This interface will support up to 3Gb/s bus speeds and is compatible with first and second-generation eSATA devices.

This interface is also hot-pluggable, however, for safest operations the drive to be connected should be powered down prior to connection and turned on after the eSATA port is connected.

ExpressCard Interface

The ExpressCard interface is also intended for connecting to mass storage devices via ExpressCard adapters. This interface will support up to 2.5Gb/s bus speeds and is also hot-pluggable.

There are a growing number of ExpressCard devices on the market. Note that several of the available cards serve non-storage purposes (i.e. wireless connection cards) and are not useable in the Pro-Cache slot. Cache-A can only test a limited set of these and will only support connection to approved devices as described in the ExpressCard Technical Note shipped with the system and updated as available from the support page of our web site.

The following interfaces are supported:

Firewire 800 Adapter Card:

Any mass storage device with a Firewire 800 (IEEE 1394b) interface. Firewire 400 (IEEE 1394a) may work as well, however the USB 2.0 interface may be faster. Consult the ExpressCard Technical Note for approved adapter cards. **NOTE:** as of v1.1 this is the only Express interface supported.

SxS Card with Sony EX content:

SxS (S-by-S) is a flash memory standard compliant to the Sony and Sandisk-standard will plug directly into the Pro-Cache ExpressCard slot. **NOTE:** not supported in the v1.1 release but coming soon.

PCMCIA Card Adapter with Panasonic P2 Card:

Panasonic P2 cards cannot plug directly into ExpressCard slots however adapters are available to accommodate these devices. Consult the ExpressCard Technical Note for approved adapter cards. **NOTE:** not supported in the v1.1 release but coming soon.

CF Card Adapter with CF Card (Red):

Red CF cards cannot plug directly into ExpressCard slots however adapters are available to accommodate these devices. Consult the ExpressCard Technical Note for approved adapter cards. **NOTE:** not supported in the v1.1 release but coming soon.

Once any ExpressCard device has been connected and powered up, after a few moments, it will be visible in the **File Manager > Source Directory > View:** popup menu after clicking on the green refresh button.

SAS Interface

The SAS interface (Serial Attached SCSI) is a data-transfer technology intended for future capabilities.

Pro-Cache RAID 0 / RAID 1 Configuration

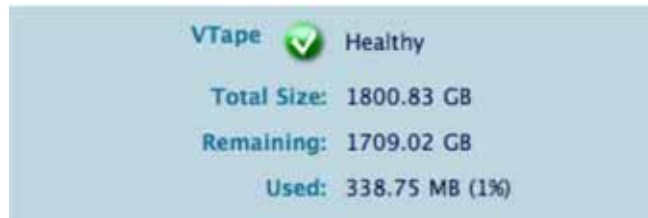
The Pro-Cache system includes 2 (two) 1 TB hard disk drives which are shipped by default in the RAID 0 configuration.



Warning

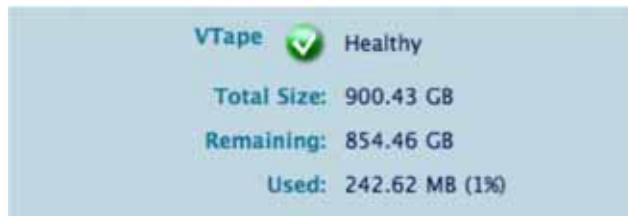
Users may change RAID configuration at any time, however any content on the shared portion of the disk will be lost. Users should also be aware that if power is interrupted or the RAID reconfiguration process is interfered with in any way, the system may become completely inoperable and require a factory rebuild.

RAID 0 provides speed and capacity but data will be lost if a drive fails. RAID 0 is a technique whereby data is stored across hard disks drives in the array – this is referred to as “Striping.” The capacity of a RAID 0 array is the total of the drives. Performance is much faster than with a single drive or with a RAID 1 array.



Example System Status report for a RAID 0 setting

RAID 1 provides complete data protection against a single drive failure. RAID 1 is a technique whereby data is stored identically on hard disks drives in the array – this is referred to as “Mirroring.” The capacity of a RAID 1 array is that of only one of the drives. Performance is roughly equivalent to that of a single drive.



Example System Status report for a RAID 1 setting

In order to change the RAID setting, you must log into a command shell on the system as the root user and type the command for this change as covered in the following sections.

Logging in from the Maintenance Terminal

To access the Maintenance Terminal functions, connect any monitor to the VGA port and any mouse and keyboard via the PS2 mouse/keyboard ports or via any of the system USB ports. Note: The system should be powered off when connecting a mouse/keyboard via the PS2 ports.

Login to the Maintenance area with the root user and password:

- The root login user name is **root**
- The default root password is **cache123**

Once logged in, you will be presented with the Maintenance home page and a variety of options – Click on the “Console” icon at the bottom of the screen

- The console will appear and a prompt at this point must say **[root@archiveXX ~]#**
if it does not, review these instruction to successfully log in

Logging in from a Terminal Session

Launch the Terminal application on a Mac or PTTY on a PC

- Log into your Cache-A appliances by typing **ssh root@archiveXX.local**
- Type **yes** at the RSA continue connecting prompt
- Type your password at the password prompt **cache123**
- The prompt at this point must say **[root@archiveXX ~]#**
if it does not, review these instruction to successfully log in

Reconfiguring the Pro-Cache RAID

Once you are logged in with a root prompt you are ready to reconfigure the array. Assure that you have the system connected to a reliable power source and that you have several hours available for the reconfiguration. Note: Switching to RAID 1 is much more time consuming than switching to RAID 0.



Warning

Any content on the shared portion of the disk will be lost. The system catalog and users settings will be preserved.

- Eject any tape if one is inserted
- Type the following command exactly:
/usr/cache-a/bin/user_init_system

```
[root@archive10 ~]# /usr/cache-a/bin/user_init_system
```

The system will present you with the following menu and you must select option six by typing a “6”:

```
Select a Choice from the Menu Below:

1) Configure for a New Cache-A Unit
2) Configure for Factory Defaults (New System)
3) Exit and Shutdown Unit
4) Reboot Unit
5) Exit
6) Configure Pro-Cache RAID

Select Choice: 6
```

The system will identify which way you are going (to RAID 1 or to RAID 0) and as you to confirm – respond with a “y”

```
There is an active RAID configuration: 1
Are you sure you want to reconfigure? (y or n)(n):y
```

The system will ask you to reconfirm this to be sure you are willing to lose your VTAPE data – reconfirm with a “y” and the system will begin the reconfiguration

```
Reconfiguring RAID to RAID Level 0. OK? (y or n)[n]: y
Stopping httpd: [ OK ]
Shutting down Tape Manager: [ OK ]
Stopping MySQL: [ OK ]
Clearing backup area:
```

Once processes have been stopped and critical system data is backed up, you will be asked 2 more times to confirm the reconfiguration – respond with a “y” both times.

```
7 /media/Catalog/system_log/systemLogs-09-24-2009-09:48.cgz
/media/lost+found/
/media/vtape/
Creating RAID Level: 0 OK to continue?: (y or n)[n]:y
Shutting down NFS mountd: [ OK ]
Shutting down NFS daemon: [ OK ]
Shutting down NFS services: [ OK ]
Shutting down SMB services: [ OK ]
Shutting down AppleTalk services:
Stopping papd: [ OK ]
Unregistering archive10:Workstation: [ OK ]
Unregistering archive10:netatalk: [ OK ]
Stopping atalk: [ OK ]
Stopping afpd: [ OK ]
Stopping cnid_metad: [ OK ]

Stopping existing RAID...
mdadm: stopped /dev/md0
mdadm: /dev/sda4 appears to contain an ext2fs file system
size=959184832K mtime=Thu Sep 24 12:41:09 2009
mdadm: /dev/sda4 appears to be part of a raid array:
level=raid1 devices=2 ctime=Thu Aug 27 13:03:55 2009
mdadm: /dev/sdb2 appears to contain an ext2fs file system
size=959184832K mtime=Thu Sep 24 12:41:09 2009
mdadm: /dev/sdb2 appears to be part of a raid array:
level=raid1 devices=2 ctime=Thu Aug 27 13:03:55 2009
Continue creating array? y
```

Once the array has been reconfigured, the system will restart critical services and report completion as shown:

```
Starting NFS mountd: [ OK ]
Starting MySQL: [ OK ]
Starting httpd: [ OK ]
Starting Tape Manager: [ OK ]

Completed RAID Reconfiguration...Please reboot system.
Press return to continue:
```

Pressing return will get you back to the main menu at which point you should select option “4” to reboot the system:

```
Select a Choice from the Menu Below:

1) Configure for a New Cache-A Unit
2) Configure for Factory Defaults (New System)
3) Exit and Shutdown Unit
4) Reboot Unit
5) Exit
6) Configure Pro-Cache RAID

Select Choice: 4
```

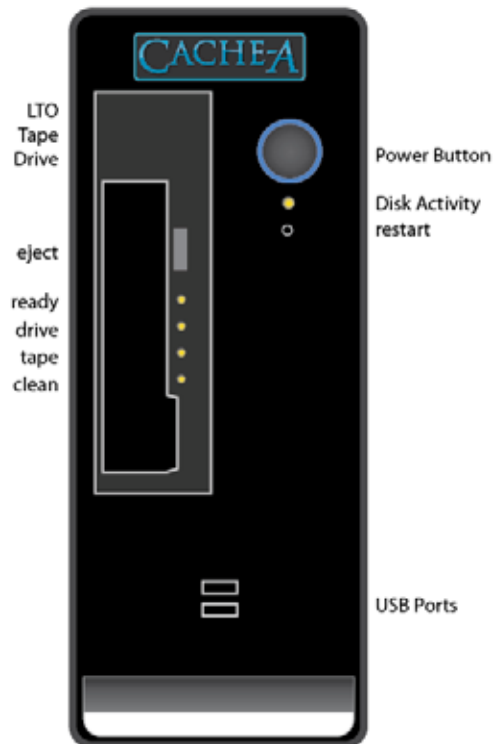
You are now ready to resume using your system with the new RAID configuration settings.

Chapter 6: Hardware Reference

This section provides an overview of the controls and connections available on Cache-A archive appliances.

Prime-Cache

Front Panel



Prime-Cache Front Panel

Power Button

Press the power button briefly to power on the unit. This button is illuminated with a blue LED surround when the system is powered on.

You may also press the button briefly to safely power down the unit – this is the same as selecting “Shutdown” from the Shutdown page. It is a good idea to ensure that all operations have completed before powering down.



Warning

You can also force a shutdown if the system is not responding by pressing and holding the power button for several seconds.

A forced shutdown may cause you to lose data in your archive, Catalog, or internal disk storage.

NEVER shut the system down by pulling the plug.

Disk Activity Light

The Disk Activity indicator is illuminated whenever the system is reading from or writing to the internal disk storage. If this indicator is ON, the system is actively moving data – do not attempt to turn the system off or reboot until this activity settles down (occasional flashes of this light are normal and can be ignored).

restart (reset)

It is not recommend you use the restart button – this is equivalent to a forced shutdown as noted above.

USB Ports

The two USB ports on the front panel are additional connections to the 4 in back and provided for convenience.

LTO Tape Drive

The LTO Tape Drive in these systems is an HP StorageWorks 1760 LTO-4 tape drive. Refer to HP documentation available on-line for more information about this drive.

eject

The eject button will force the tape drive to rewind and eject the tape unless it is actively writing. Unless you are sure no other users are using the drive and there are no pending tasks, you should not use this button to eject. Also, note that ejecting with this button does not give you the opportunity to automatically erase the VTAPE (VTAPE contents are preserved).

ready

Green - Indicates power and activity:

- Off - Power off or self-test failure
- On - Powered on and ready for use, but no activity

- Flashing - Engaged in activity, such as responding to Read, Write or Space commands or performing a self-test

drive: Drive Error

Orange - Indicates drive problems:

- Off - No fault
- Flashing - Unrecoverable hardware failure. A power cycle or successful tape load will turn the LED off, but the LED will start flashing again if the same operation is performed and the hardware fault is still present

tape: Tape Error

Orange - Indicates tape problems:

- Off - No fault
- Flashing - Current tape is faulty, such as unreadable cartridge memory or unsupported type. Do not use the cartridge; replace it. The LED will go out when a tape load begins.

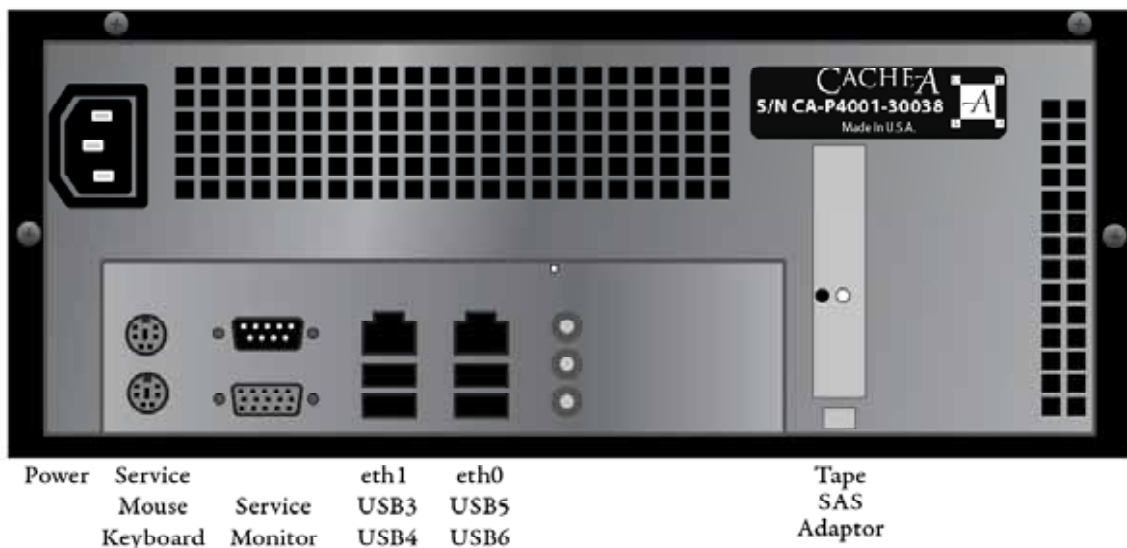
clean

Orange - Indicates whether the drive needs cleaning:

- Off - Cleaning not required
- On - Cleaning cartridge being used. The Ready LED flashes.
- Flashing - Cleaning needed. The LED continues to flash if the drive is power cycled, and will only go out after a supported cleaning tape has been used.

Rear Panel

The back of the Prime-Cache system provides connections for power, networking and other functions as labeled in the diagram below



Prime-Cache Rear Panel

Power

Cache-A systems are powered by an auto-ranging power supply which will accept from 110VAC to 250VAC and from 50HZ to 60HZ line frequencies.

Mouse / Keyboard Ports

The two PS2 ports are provided for connecting PC style mouse and/or keyboard for service monitor operations. USB mouse and/or keyboards may also be used.

9 Pin D

The serial port is not used

15 Pin D – Service Monitor

Connect any VGA or higher resolution monitor to this port for service and maintenance operations – see the Maintenance Terminal section for more information.

eth1 / eth 0

Two Gigabit (1000BaseT) Ethernet ports are provided for network connections.

Ethernet Port LED Indicators

LED indicators on each Ethernet port confers the following information:

Left LED: Yellow

Off - LAN Link not established

On - LAN Link established

Blinking - Communication ongoing

Right LED: Green/Orange

Off - 10 Mb/s

Green - 100 Mb/s

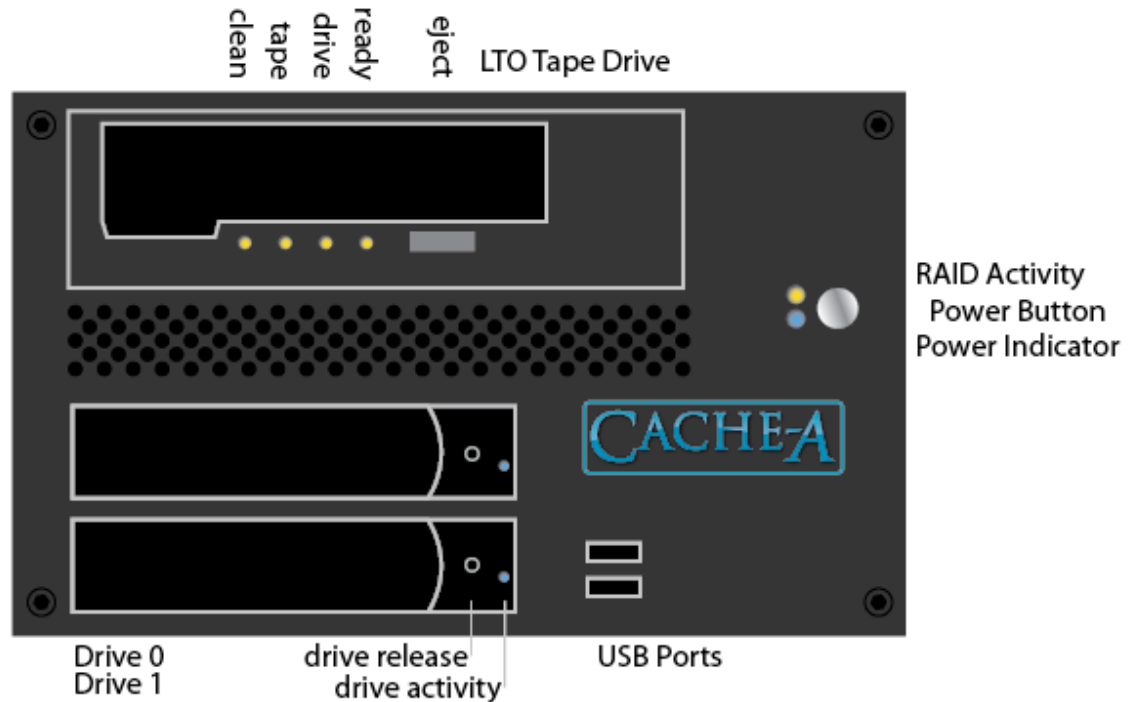
Orange - 1000 Mb/s

USB

Any of the 6 USB connections can be used for mass storage device connection and / or mouse / keyboard connection.

Pro-Cache

Front Panel



Pro-Cache Front Panel

Power Button

Press the power button briefly to power on the unit. See Prime-Cache section for power button operations.

RAID Activity Light

The Disk Activity indicator is illuminated whenever the system is reading from or writing to the internal disk storage array. If this indicator is ON, the system is actively moving data – do not attempt to turn the system off or reboot until this activity settles down (occasional flashes of this light are normal and can be ignored).

Power Indicator

A bright blue LED shows that the system is powered on.

USB Ports

The two USB ports on the front panel are additional connections to the 4 in back and provided for convenience.

LTO Tape Drive

See the Prime-Cache LTO Tape Drive section above for information about the tape drive.

drive release

Each drive tray can be released from the drive cage by inserting a un-bent paperclip or equivalent into this hole – the front eject lever will spring up; pull on the lever to eject the drive. Use this **ONLY** in the event of a drive failure.



Warning

Removing a drive during operations can result in loss of data.

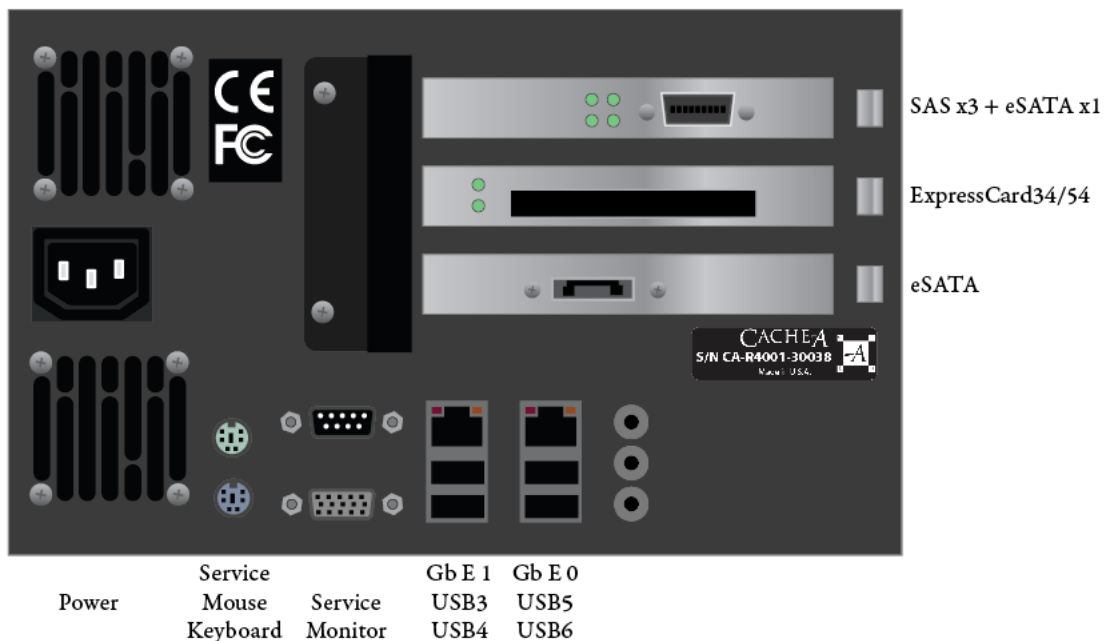
Pro-Cache drives are removeable only for the purposes of easy replacement in the event of a drive failure. Pro-Cache drives can not be read in other computer systems.

drive activity

A small blue LED at the right edge of the drive tray will illuminate when each individual drive is reading or writing.

Rear Panel

The back of the Prime-Cache system provides connections for power, networking and other functions as labeled in the diagram below:



Pro-Cache Rear Panel

Refer to the preceding Prime-Cache back panel description for the lower connection panel area.

Refer to the preceding Pro-Cache Unique Features section for more information about the mass storage interfaces provided on the upper horizontal card slot fences.

Maintenance Terminal

To access the Maintenance Terminal functions, connect any monitor to the VGA port and any mouse and keyboard via the PC mouse/keyboard ports or via any of the system USB ports.

Login to the Maintenance area with the root user and password:

- The root login user name is **root**
- The default root password is **cache123**

Once logged in, you will be presented with the Maintenance home page and a variety of options offered by clicking on any of the Icons in the row across the bottom of the screen



Warning

Unauthorized system modifications made using these system tools are not covered under your support agreement. Making network changes, adding software, enabling other Linux functions, and similar activities may interfere with system operations.



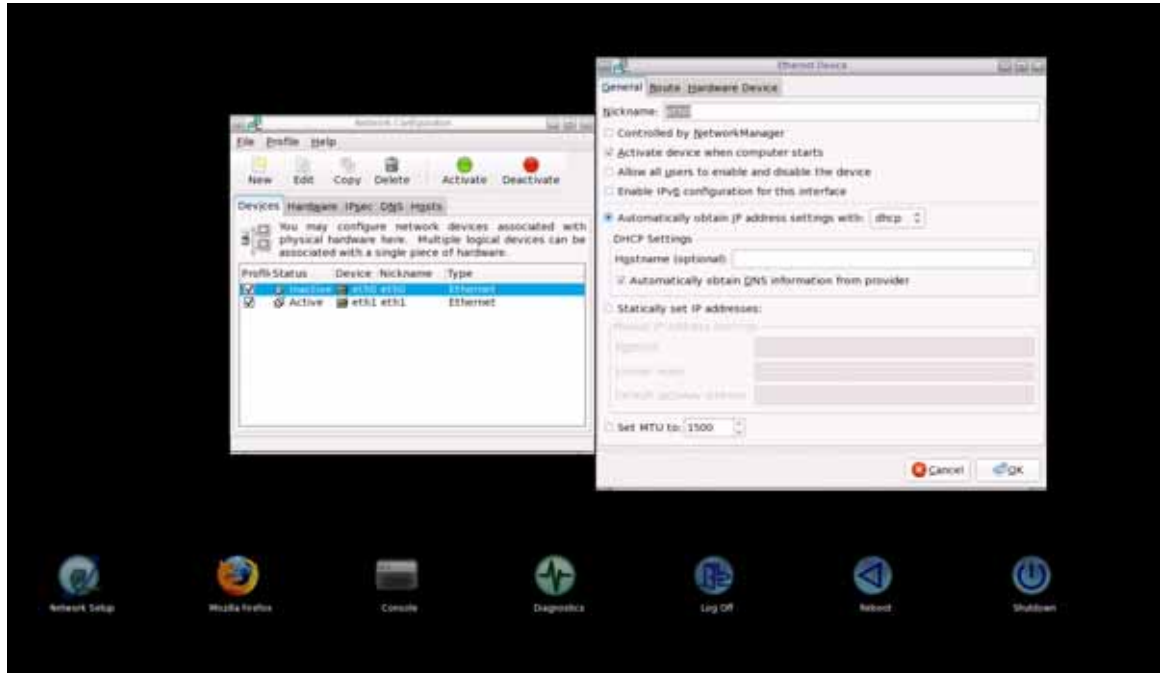
Maintenance Home Page

Maintenance Options

The following options are available by clicking on the associated icon:

Network Settings

The Network Settings button invokes a standard Linux network configuration tool as shown in the following screen.



Maintenance – Linux Network Configuration Tool



Warning

Use of this tool is not as obvious as it may appear – if you are not thoroughly familiar with Linux networking, do not attempt to configure your network settings with this tool. Doing so could result in loss of communications with your archive appliance.

Mozilla Firefox

The Firefox button will launch an internal copy of Firefox and load the login page of the archive appliance interface. You can operate all functions of the system from here in the same way as you would from a client computer.

Console

The Console button will launch a Linux console.



Warning

You are logged in as root – you are all-powerful from this terminal. Make sure you are under the guidance of a Cache-A technician or really know what you are doing.

Diagnostics

The Diagnostics button launches a set of text based menu driven tape drive and system diagnostics.

Logoff

The Logoff button will log you out of the Maintenance system.

Reboot

The Reboot button will cause the system do a warm restart.

Shutdown

The Shutdown button will cause the system to do an orderly power down.

Appendix A: Cache-A A-Series Best Practices

This section covers some lessons learned and cautions which should be observed to help our customers have the best possible experience.

Backup Your Catalog

The one part of your system that has the potential of being lost is the internal catalog of tapes. While you can always re-create it by inserting every tape again, this is a time-consuming process. It makes sense to regularly back up this catalog as described in the System Tools > Backup Catalog Tab section. It doesn't matter if you backup on to tape or other media, but doing this about once every 10 tapes is recommended.

Note that this backup may be omitted on a Pro-Cache model if it is configured for RAID 1 as the catalog is then mirrored in on both drives, although you may still do so if you want to keep a copy off-site.

Networking Considerations

These archive appliances connect over Gigabit Ethernet (GbE), and that networking technology officially requires CAT6 or better quality cabling. Many users find that older CAT5e or even plain CAT5 wiring works fine over short runs as long as all 8 wires are employed (some older Ethernet cables only have 4 wires connected and these will not work at all). If you are experiencing network issues, cabling quality and length of runs are one of the first places to consider.

In the past, connecting Ethernet devices without a router or switch required a "Flipped" cable which swaps transmit and receive pairs. These should never be required on any Gigabit Ethernet device as this is automatically detected and accommodated by A-Series drives as with all other GbE products.

Gigabit Ethernet is backwards compatible so you can connect an A-Series system to 100Base or even 10Base networks although your transfer speed will be much slower.

When Directory Updates Occur

It is important for users to understand that the directory (also known as the TOC or Table of Contents) is updated at the end of each “Session” as identified in the Transfer Summary listing. A Session is usually the set of files a user has grouped to initiate a transfer but these are sometimes broken up into several sets or sometimes collected with other files into a larger set based on the appliance’s algorithms for efficiency.

If power is interrupted before the current session is completed, all files written in that will never be recorded in the TOC and the archived data has no record of being written and is at that point lost. The tape’s current TOC is also lost, but there are two backups for this: a) the internal system catalog is constantly updated and will contain the latest valid information for the tape and will be automatically written back to the tape during recovery, or b) in the event that the internal catalog is also lost, the TOC can be recovered from rereading the tape itself (this can take several hours).

For this reason we strongly recommend that all Cache-A appliances be on an uninterruptible power supply (UPS).

File Naming Considerations

When transferring files via mounted volumes, Cache-A Archive appliances should handle all filenames of any length compatible with Windows, MacOS, and Unix/Linux operating systems.

Note that when considering file names, there will be still be issues when users attempt to restore such files cross platform. When for instance, a Mac file has characters illegal on a Windows machine, when you attempt to restore it to a Windows machine, the file name will be converted to something acceptable to the target OS.

In general, it is best practice to limit your filenames to be absolutely safe and adhere to the Windows filename restrictions:

- No control characters. Carriage return (CR), NULL, and Linefeed (LF) are control characters
- Don’t use < > : “ / \ | ? * %
- Don’t use a space or period as the first or last character and ideally, don’t use spaces at all

Third Party FTP Clients

It is possible with Cache-A devices to use FTP file transfers to archive to the appliance.

Third party FTP Clients typically do not handle many unusual characters such as quotation marks or slashes, and some can't handle even minor infractions such as extra spaces or periods. You should be aware of the limitations of your FTP tools when using this technique to transfer files.

Third party FTP Clients typically do not support Apple file resource forks as described in the following section.

Apple Resource Forks and A-Series

Apple computers before Mac OSX used something called “resource forks” to keep track of what application created each file rather than the Windows convention of a three letter dot suffix to keep track of the association (i.e. a “.doc” file is a Microsoft Word file or a “.jpg” is a JPEG image). Resource forks could also keep track of additional information including file types and custom icons. Resource forks are “deprecated” in the Mac OSX, which is to say that they are supported but applications are not supposed to use them anymore. They are in fact still widely used and important for some applications.

Each resource fork file is a hidden file on the Mac OSX and using a cross platform technology that Apple developed and named “AppleDouble,” is converted to a “dot underscore” file (for each filename, there will be a matching ._filename). These files will automatically appear on the appliance when MacOS files are copied to it to preserve full Apple compatibility. Several other “hidden” files come over when copying Mac folders and all these files may be safely ignored.

Lossless Data Compression

You may well find you can get more than the 800GB stated capacity of our tape cartridges. All LTO drives have hardware lossless data compression built in and running transparently in the background.

Normally video data does not compress much further with this and whenever no savings are seen, the data is stored exactly as it comes in to the appliance. With other types of data (especially files like documents and spreadsheets) this compression can save up to 2:1. Never worry about this changing your data in any way – every bit stored is guaranteed to restore bit-for-bit as it came in, which is why it is called “lossless.”

A complete accounting of how much data is fitting on any tape is displayed in the tape information dialog available from the Main Menu.

**Taking A-Series
On the Road**

It is becoming increasingly popular to take LTO drives out into the field to make backups of the increasing range of cameras that record to RAM and Hard Disk.

There are no ruggedized versions of Cache-A archive appliances yet available, however current models should be safe to use in the field as long as they are handled carefully – do not subject systems to impact or physical abuse. There are three additional areas to exercise caution: contamination, temperature, and humidity.

Keeping the drive and tapes clean and dust-free is extremely important to ensure long-term operations without problems. Sealed containers and/or using plastic bags to keep contamination out of both the drive itself and tape cartridges is strongly recommended. Keeping a cleaning tape on hand in the event you get a cleaning light warning condition is also an extremely good idea.

The range of temperatures that both the drive and tapes can withstand is very broad, but the range they should be operated in is much more critical as can be seen in the table below. The point here is that whether you are starting with a system or tape that was baking in the sun or freezing in the cold, try to let it slowly get as close back to room temperature as possible before using.

Description	Storage	Operating
LTO-4 A-Series Appliances	-40°to 66°C (-40°to 149°F)	10°to 40°C (50°to 104°F)
Ultrium 4 Tape Cartridges	16 - 32°C (61 - 90°F)	10 - 45°C (50 - 113°F)

Finally, all of these systems are rated for 20 to 80% non-condensing humidity or better. Unless you are in a very wet environment, this is not likely to be a problem, but if you start to notice beads of moisture forming on your equipment, it is time to be cautious about making backup tapes. It is advisable to seek out air conditioners and/or space heaters to try to get the environment to the point where moisture is not collecting on tapes or drives before using.

Appendix B: Regular Expressions

The following table shows a summary of special characters that can be used in a regular expression search within the File Manager.

Operator Type	Examples	Description
	a A y 6 % @	Letters, digits and many special characters match exactly
Literal Characters Match a character exactly	\\$ \^ \+ \ \? \n \t \r \cJ \cG \xa3	Precede other special characters with a \ to cancel their regex special meaning Literal new line, tab, return Control codes Hex codes for any character
Anchors and assertions	^ \$ [[:<:]] [[:>:]]	Field starts with Field ends with Word starts with Word ends with
Character groups any 1 character from the group	[aAeEiou] [^aAeEiou] [a-fA-F0-9] . [[:space:]] [[:alnum:]]	any character listed from [to] any character except aAeEio or u any hex character (0 to 9 or a to f) any character at all any space character (space \n \r or \t) any alphanumeric character (letter or digit)
Counts apply to previous element	+ * ? {4} {4,} {4,8}	1 or more ("some") 0 or more ("perhaps some") 0 or 1 ("perhaps a") exactly 4 4 or more between 4 and 8
Alternation		either, or
Grouping	()	group for count and save to variable