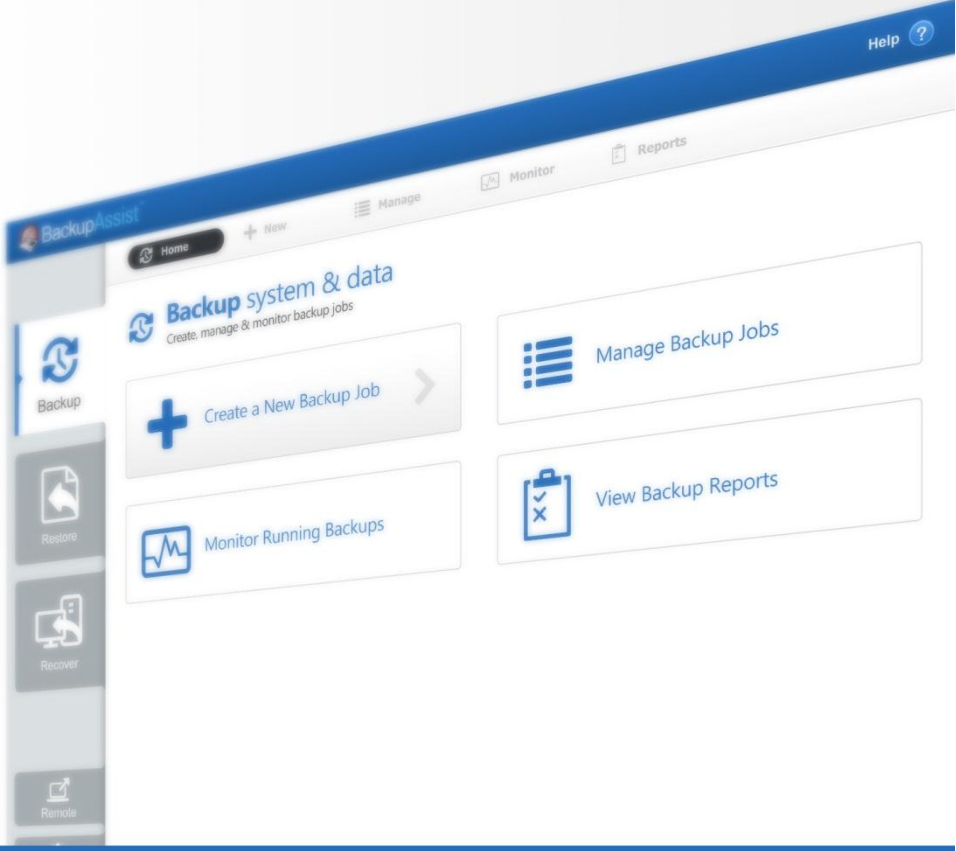


BackupAssist™

BackupAssist v7

File Protection – Using Rsync

Whitepaper

backupassist.com

Cortex I.T.

Contents

1. Introduction

File Protection
For historical versioning of files
Method: File Replication
Backup to Disk / iSCSI / NAS / Rsync

BackupAssist File Protection includes a powerful tool called Rsync that can back up data across the internet to any Rsync host. This whitepaper outlines how to use Rsync to protect your data.

Adding Rsync backups to your backup strategy is an excellent way of insure yourself against data loss. Critical files can be copied to a secure, offsite location, away from your office, and backing up across the internet overcomes the need to swap tapes or hard drives. Once you've selected the host where your data will be stored, no further equipment or maintenance is required. Additional storage space can be easily added to the data host as your data requirements grow, so you don't have to worry about purchasing replacement hardware. Best of all, your critical files are available whenever you need them and can be accessed from wherever you are, using BackupAssist.

Documentation

This whitepaper provides a comprehensive guide to File Protection using Rsync and can be used in conjunction with other BackupAssist guides.

- For information on BackupAssist File Protection, see the: BackupAssist File Protection Whitepaper.
- For information on the BackupAssist Backup tab, see the BackupAssist Backup Tab Whitepaper.
- For information on the BackupAssist Restore tab, see the BackupAssist Restore Tab Whitepaper.
- For information on the BackupAssist Recover tab, see the BackupAssist Recover Tab Whitepaper.

Licensing

File Protection is a standard feature included with the BackupAssist license. To back up data across the internet with Rsync, requires the *Rsync Add-on* license, once the initial trial period has expired. Please contact your local BackupAssist reseller or distributor for pricing information, or visit www.BackupAssist.com.

For instructions on how to activate / deactivate license keys, visit out Licensing BackupAssist page.

Terminology

In order to avoid confusion about the use of the words “client”, “server”, “Windows Server” and “Rsync Server”, we will use the following terms to avoid ambiguity:

Data Host: The remote machine that will be used as your backup destination.

Rsync Server: The same as the data host, but specifically referring to the machine running Rsync that accepts incoming connections and data from Rsync clients.

Rsync Client: A machine that contains your working data (typically a file server) that has BackupAssist installed. BackupAssist comes packaged with the Rsync libraries necessary to transfer data to the Rsync Server during a backup.

2. Rsync technology

Overview

Rsync is an open source software application used to synchronize files and directories from one location to another while minimizing data transfer. BackupAssist's implementation of this technology provides the ability to backup your data across the internet. The data transfer is minimized using an algorithm that will transmit only the parts of the backup selection that have changed. Rsync also compresses all data packets sent, further reducing transfer overheads.

Rsync uses a checksum method to perform the bit level data transfer. Rsync checks whether any data has changed by looking at the file size and modification date. If no data has changed, Rsync will not transfer any data, saving time and bandwidth. If files do not match, Rsync uses a checksum method called a *rolling checksum* on the changed files to see where it has been altered or appended. It will then transfer only the altered or appended data within the file.

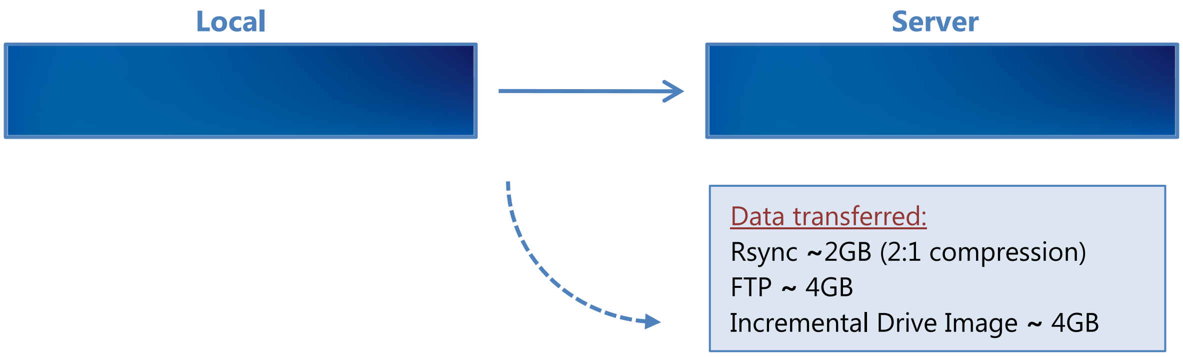
Rsync can cater for data that has been inserted, added, removed and shifted, with a minimum transfer overhead. In real terms, that means more efficient use of your bandwidth and data allowances. As Rsync will only transfer data that has changed (and knows when file alterations or movements have occurred) your Internet based backups will take a lot less time when compared other methods such as FTP.

Implementation

To help better understand how Rsync transfers work we will take a look at a hypothetical three day backup scenario.

The scenario examines three different backup methods: Rsync, FTP and incremental drive imaging.

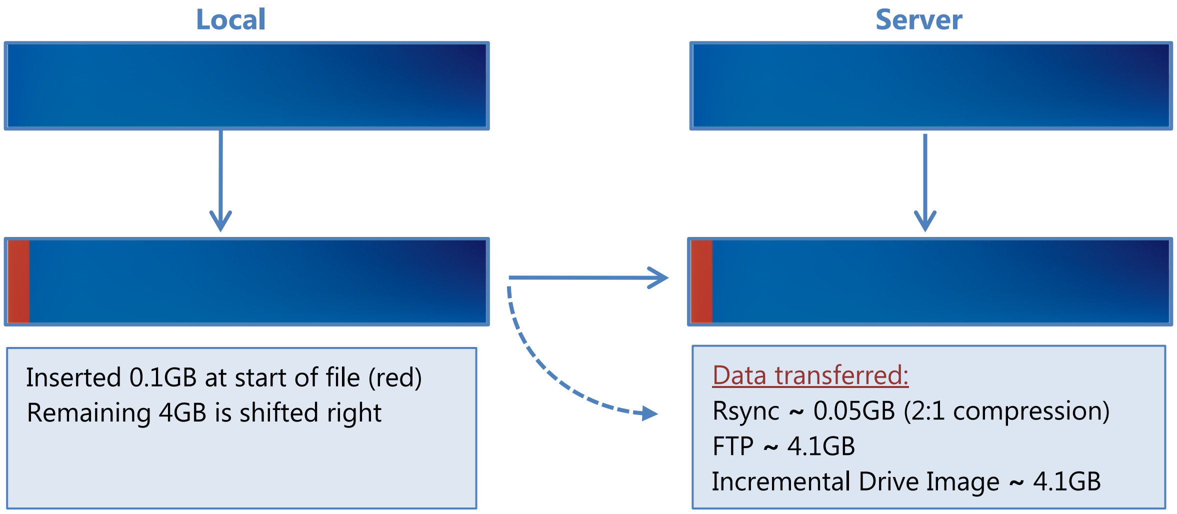
Day 1: We begin with a 4GB data file backup.



Data transferred:
Rsync ~2GB (2:1 compression)
FTP ~ 4GB
Incremental Drive Image ~ 4GB

Looking at this first backup we see that for the initial data transfer there is a 100% transfer for both Incremental drive imaging and for FTP. Thanks to Rsync's packet compression we see a 50% reduction in the initial transfer. Depending on your Rsync server's setup this initial overhead can be removed by seeding your backup server locally, a method we will discuss later in this paper.

Day 2: On the second day we have added a further 0.1 GB to the start our data file.

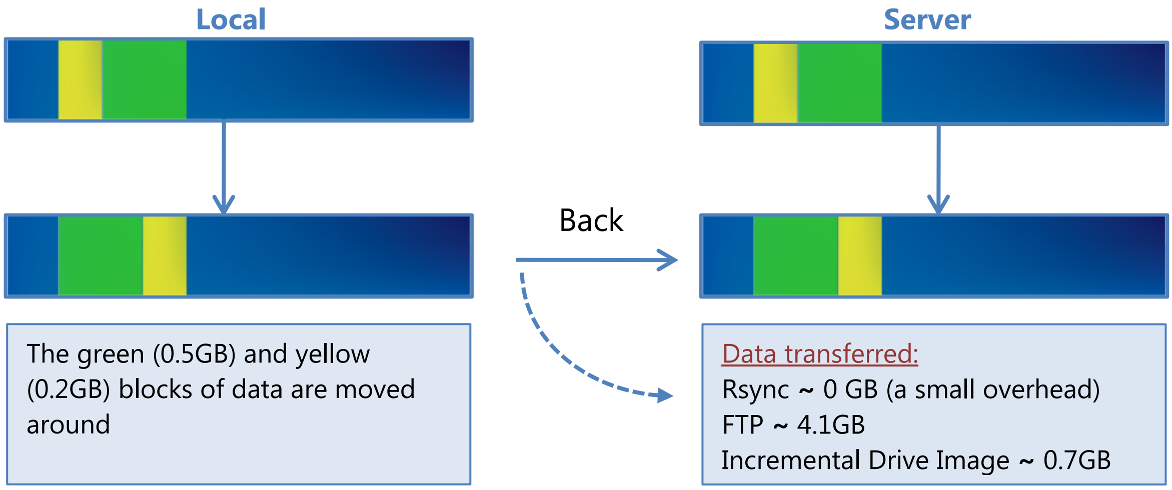


Inserted 0.1GB at start of file (red)
Remaining 4GB is shifted right

Data transferred:
Rsync ~ 0.05GB (2:1 compression)
FTP ~ 4.1GB
Incremental Drive Image ~ 4.1GB

We can see that both FTP and incremental drive imaging perform a full backup of the file. Rsync only backs up the changed data within the file, and compresses the sent data, resulting in a 50mb transfer.

Day 3: This day no data has been added, but data *has* been shifted within the file.



The green (0.5GB) and yellow (0.2GB) blocks of data are moved around

Data transferred:
Rsync ~ 0 GB (a small overhead)
FTP ~ 4.1GB
Incremental Drive Image ~ 0.7GB

Rsync is able to recognize that the data is already on the backup server and will reorganize the file with a minimal instruction file. Incremental drive imaging is also aware that the data was moved, however it must re-backup the moved data as this section does not match the data source. FTP once again has to do a full backup of the source data.

Summary

As demonstrated in this example, Rsync delivers substantial performance gains. With the ability to check what data is still the same, then append, remove or modify it as necessary to match the local source it can greatly reduce backup overhead.

The key benefits of Rsync:

- Improves offsite backup speed through bandwidth optimization
- Reduces network data transfer by transferring only new data
- Open standard protocol for maximum compatibility and flexibility in backup destination selection

3. Rsync data hosts

As Rsync is an open protocol, you have the option of either storing your data on a third party destination server, or supporting a destination Rsync server yourself.

For more information on how to get the most out of Rsync, visit our Video Presentations page.

Third Party data host

Third party data centers, ISPs and cloud providers can support Rsync backup destinations. These solutions have the advantage of high availability networks, and some datacenters also offer geo-redundant storage.

Third Party data host: setting up S3Rsync

BackupAssist includes a dedicated configuration screen for backups to Amazon S3 via the s3rsync.com service. To backup to Amazon S3 with Rsync you will need:

- **Amazon account**
  In your Amazon Web Services account, you will need to obtain your Access Key ID and generate a Secret Access Key. Then you will need to create an S3 bucket to use for your backups. See this article for a guide to the Amazon S3 Simple Storage Service.
- **S3Rsync account**
  When you sign up for an s3rsync.com account, you will be given a username and a private SSH key file. Save the SSH key file somewhere on the machine on which you wish to run BackupAssist.
- **BackupAssist**.
  Once you have performed these steps, you can set up your job in BackupAssist using the S3Rsync *Destination* selection. See the Creating a File Protection backup using Rsync section of this whitepaper for more information.

Do-it-yourself host

Any Rsync Server such as an Rsync-enabled NAS device, Windows or Unix machine can be used to store backups using Rsync. The do-it-yourself approach has the advantage of keeping data in your control, and a lack of monthly hosting fees or limits to the amount of data backed up.

Using your existing internet connection and hardware can be a cost effective solution. A popular choice of destination is an Rsync-enabled NAS device placed in the business owner's home. Legal firms especially appreciate this approach, since control over information is their primary concern.

Rsync servers can be one of two flavors:

- **Rsync over SSH** (preferred) runs Rsync via a secure shell (SSH, port 22) which means all traffic over the internet is encrypted. User access control is modified by editing user accounts on the server.
- **Daemon mode** runs Rsync as a normal TCP/IP service. User access control is modified by editing the Rsync.conf file. Internet traffic is not encrypted. To learn more, review our online article Configuring BackupAssist for Rsync without SSH, under the section, *Altering the rsyncd.conf file*.

In the following sections, the **Windows** and **Linux** data hosts support Rsync over SSH. However, some **NAS** devices do not, and Daemon mode must be used instead. Daemon mode is still an acceptable solution provided a secured LAN/WAN (such as site-to-site VPN) is used.

Do-it-yourself hosting: setting up a Windows Rsync host

To set up a Windows machine to act as an Rsync Server, you will first need to install both SSH and Rsync on your Windows Server. We recommend CopSSH and cwRsyncServer. An installer for each can be found on our website by visiting http://www.backupassist.com/rsync.

Prerequisites:

- Windows Server 2003 (or later) machine with network connectivity and space to store backup data.
- Windows Server 2008 or 2012 are highly recommended because of their support for both backup histories and single-instance store in Rsync backup solutions.
- Windows Small Business Servers (SBS) should not be used as Rsync hosts.
- The cwRsyncServer installer.
- The CopSSH installer.
- BackupAssist v5.1.0 or later installed on the Windows machine you want to back up (i.e. the client).

Installing cwRsync:

1. Run the cwRsyncServer installer.
2. Continue through the installation wizard, installing the package to a location of your choice.
3. During the installation you will be presented with the popup on the right. We suggest leaving the SvcCWRSYNC account as is. Write down the password provided.
4. Click *Install* to install the package. Once this is finished cwRsync will be present on your system.

Installing CopSSH:

1. Run the CopSSH installer.
2. Continue through the installation wizard, installing the package to a location of your choice.
3. During the installation you will be presented with the popup on the right. We suggest leaving the SvcCOPSSH account as is. Write down the password provided.
4. Click *Install* to complete the process of installing CopSSH on your system.
5. During the Activate user part of the installation, you will be presented with a popup showing the service status and any active connections. At any time after the install you can access *Activate a user* from your start menu to allow SSH access to that user. You must activate at least one user before you can register an Rsync client.
6. Click *OK* to continue your installation.

Activating a user

If you are planning to use SSH, then before you register a BackupAssist client with your Rsync server, you must activate a user with CopSSH.

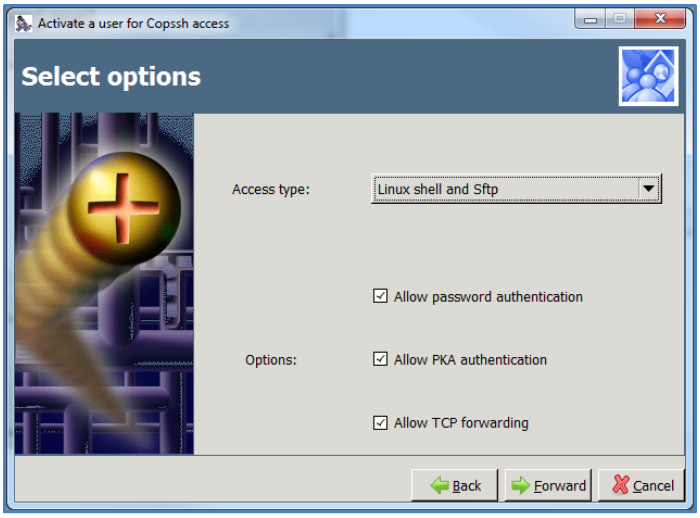
1. In the *Start* menu, under *All Programs* -> CopSSH, select. The CopSSH Control Panel will open.
2. To start the process to activate a user, click on the *Users* tab across the top of the user interface.
3. Click on the *Add* button to bring up the wizard to activate a user.

DO NOT ACTIVATE USING YOUR ADMINISTRATOR ACCOUNT. Doing so will cause a lock down on the account due to CopSSH's security settings. We recommend activating a newly created account.

4. Click *Forward* on the opening screen.
5. On the second screen, select the Domain and type in the user which you wish to activate.
   Click *Forward* once complete (admin is a manually created account we'll use for this example).

6. Change the *Access Type* to Linux Shell and Sftp using the drop-down menu.

   Leave all *Options* enabled as they are by default.



Activate a user for Copssh access

Select options

Access type: Linux shell and Sftp

Options:

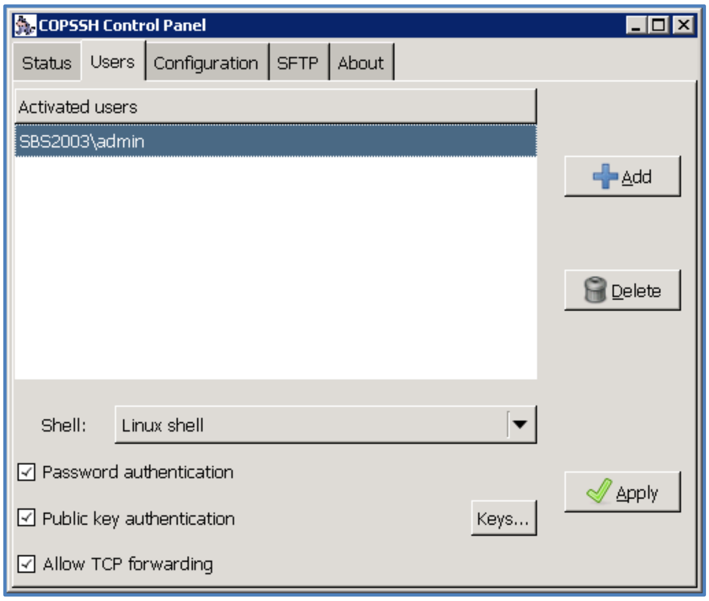
☑ Allow password authentication

☑ Allow PKA authentication

☑ Allow TCP forwarding

7. On the fourth screen, click on *Apply* to complete the wizard and activate the user.

   The user should now be showing as activated within the CopSSH Control Panel.



COPSSH Control Panel

Activated users

SBS2003\admin

Shell: Linux shell

☑ Password authentication

☑ Public key authentication

☑ Allow TCP forwarding

Your user's home directory will be located at (for example) *C:\Program Files\ICW\home\user.*

The location of this directory can be changed by editing the file *C:\Program Files\ICW\etc\passwd.*

Note: If you uninstall the Rsync server, be aware that the Windows service users *SvcCOPSSH* and *SvcCWRSYNC* are not removed. So if you then re-install the CWRsync Server package the Windows users cannot be recreated because the passwords will not match. This ultimately means the COPSSH and Rsync services will not start on the server. The fix is to uninstall and remove the users manually then re-install to add the users again with known passwords.

Do-it-yourself hosting: setting up a Linux Rsync host

Most FreeBSD and Linux servers can be used to host backup data. BackupAssist has two requirements: that the data host has an SSH server and Rsync installed. All major Linux distributions (such as Fedora, RedHat Enterprise, Ubuntu, Debian) have these two prerequisites available as install options. The most common SSH server is OpenSSH.

> **Note**: You can choose to run Rsync as a daemon on your Linux server. (For security reasons, we do not recommend this – use Rsync over SSH instead.) If you choose to run Rsync in daemon mode, you will not need to have the SSH service installed. For instructions on setting up BackupAssist to connect to an Rsync daemon please view the Configuring the BackupAssist client for a NAS server section below.

To determine if your system has the prerequisites installed, log into your system, start a shell and type:

```
man rsync     – this should return the man page for Rsync if installed. Type ‘q’ to exit the man page.
man sshd     – this should return the man page for sshd if installed. Type ‘q’ to exit the man page.
```

You should use your distribution’s software package manager to install these packages, if they are not already installed. Most commonly they can be found under the *Server* or *Security* categories. The next step is to create logons on your data host. We recommend creating a separate logon for each client. For example, if you host data for 5 different companies, create 5 different accounts so that each company will only be able to see their own data. You should also make sure that each client’s home directories are on a partition that contains sufficient space to host their data.

You **must** also change the permissions on each user’s home directory, otherwise most SSH daemons will not allow you to connect to the server using the public/private key method (which BackupAssist uses). To do this, use the chmod command – for example for a user “fred”, type in the following (when logged on as root): chmod 700 /home/fred

Do-it-yourself hosting: setting up a NAS Rsync host

Backing up to an Rsync-enabled NAS can be a very effective solution. The advantage of using a NAS is that, as an appliance, it can be close to a turnkey solution and easier to manage. Each NAS is different and some support Rsync over SSH, whereas others only support Rsync Daemon mode. There is however a list of requirements that must be met in order for BackupAssist to connect to the device.

To use your NAS as an Rsync data host you will need:

- A NAS that is running Rsync as a daemon, or one that has Rsync and an SSH service running.
- Setup a share to act as a root directory for your Rsync backups and allow read and write permissions to that directory.
- If your NAS requires a password to connect to the Rsync service, you will need BackupAssist to authenticate to it.
- Your NAS will need to have the correct ports open for your Rsync Daemon or SSH service (873 and 22 respectively).

The options vary from device to device. You will need to consult your manual to setup the destination.

> **Below is a list of NAS vendors that support Rsync.**
>
> QNAP : drobo : NETGEAR : Synology > Click on any of the vendor below to go to their website.

Do-it-yourself hosting: Rsync host configuration tips

The following table contains tips designed to address common mistakes and highlight considerations that will help you set up an Rsync host.

Tip	Description
Make sure it's Rsync compatible	When you select hardware to use as an Rsync server, make sure the hardware can support the Rsync protocol. If you select a Windows system, it must be able to run cwRsync. A NAS device must have Rsync specified as one of the protocols supported. If in doubt, ask your hardware vendor for confirmation.
Processing speed is important!	Rsync can be a very processing intensive protocol - it uses checksums that calculate what data needs to be transferred. A lot of NAS devices come with lower range CPUs built-in. This will affect the overall time taken to complete an Rsync backup.
Ensure there is plenty of disk space available	Although you may think you have enough disk space available when you first implement your Rsync solution, a common cause of Rsync problems is that the storage space eventually runs out. Some of the BackupAssist backup schemes are designed to retain significant amounts of data – meaning the space you have can be used up faster than you expect! Running out of disk space is a common problem and it can cause a lot of problems when it occurs. For this reason, the available storage space on your Rsync host should be monitored.
Make sure you set the correct backup path	Some NAS devices contain a boot partition (similar to Windows Server 2008R2). Sometimes, if you enter the incorrect path your Rsync backup will write to this boot partition – which could in turn cause major issues with your backup and hardware.
Seed your backup	If you're planning on using a NAS device, you can run your seed backup by connecting your NAS device directly to the local network. This avoids having to seed to a USB drive, and then running the seed to the NAS device in a two-step process (saving you a lot of time).
Double check permissions	Even though you are logged in as a Domain Admin, most NAS devices require users to be set up locally within the unit and have permissions configured locally as well. If you receive permission issues, this is usually the reason as to why.

4. Backup considerations

Before creating a backup job, it is important to understand what backup and restore options are available. This section provides guidance on some key considerations.

Exchange VM Detection

If your backup job contains a Hyper-V guest with an Exchange Server, the authentication information for that guest should be entered into the **Exchange VM Detection** tab on the **Selection** screen when you create the backup job. With these credentials, BackupAssist can detect what guests have an Exchange Server, and list the EDB file available for each guest when you perform a restore using the Exchange Granular Restore console

The Exchange VM Detection tab will appear when the Hyper-V role is installed and running on the server. If you are backing up multiple Exchange guests, each one should have the same username and password.

The Hyper-V process is automated but the restore requires both the *Exchange Granular Restore Add-on and the Hyper-V Granular Restore Add-on* licenses.

VSS Application backups

The Volume Shadow Copy Service (VSS) is a Microsoft Windows Service that creates a copy of an application's data so the data can be backed up while the application is running. This means the data will not change or be locked while a backup is taking place. BackupAssist is VSS-aware, so File Protection, File Archiving and System Protection backups can detect VSS applications such as Exchange, SQL, Hyper-V and SharePoint. BackupAssist will display a VSS application as an application container during the *Destination* step of the backup job's creation. You can select the container or individual components and BackupAssist will select the files that need to be backed up.

In some cases, only applications that are running will be detected. If an application is not listed, try re-starting the application and the VSS service and then click the *Refresh* button in BackupAssist.

For Windows Small Business Server 2003, a registry entry modification is needed to see an Exchange Server. See our online blog post, Backing up Exchange with SBS 2003, for more information.

Restore vs. Recovery

A restore is the process of accessing a backup and restoring it to the original (or a new) location, if your data is lost, corrupted or if you want an earlier version of that data. However, if your computer cannot start itself, you may need to perform a recovery.

A recovery is the process by which a computer is recovered after hardware has been replaced or an operating system failure has occurred, and your computer can no longer start itself. To perform a recovery you need a bootable media to start your computer, and an image backup that the bootable media can use to recover your operating system, data and applications.

For more information on data recovery, see the Recover tab & RecoverAssist Whitepaper.

5. Rsync backup considerations

The performance and flexibility of backing up across the internet can depend on how Rsync is implemented. Below are some key considerations when planning your Rsync backup solution.

Rsync as a BackupAssist add-on

Rsync will appear as a destination option when you create a File Protection backup, but it requires the *Rsync Add-on* license or the Rsync standalone license (offsite-only backups). It is important to maintain your Rsync license because your Rsync backups will not be accessible if your license has expired.

Considerations for technologies

System State

Rsync cannot be used to create a System State backup. A System State backup is explained here.

Exchange databases and SQL databases

BackupAssist's *File Protection using Rsync* includes fully integrated support for VSS application backup and restore. Microsoft applications such as Exchange, SQL, SharePoint and Hyper-V are all fully supported, as well as any other VSS-aware application that uses standard VSS restore methods. Simply choose the VSS application that you want to back up from the list of detected applications. You can even drill down and choose individual components (databases, storage groups, etc.) to backup.

Synchronizing drive images using Rsync

Image backups can be synchronized across Rsync, but you will experience significant performance issues, and it is therefore not recommended. If you really want to back up an image using Rsync, you can, but we believe there are better ways. The purpose of doing multiple backups is redundancy. That means protecting your data in different ways, to different locations. If you synchronize a drive image offsite, you run the risk that the drive image is bad and you have just lost all of your backup data. Instead, if you back up your underlying file system using Rsync, and your image is bad, you still have the files and folders at your remote site.

The use of Rsync is best suited to a regular file system. Due to the creation of rolling checksums on altered backup files, it is disadvantageous to have files combined into an archive. This is because only files that are flagged as altered will have the rolling checksum performed on them. If you have a very large single archive file (>100 GB) it will take much longer to complete the rolling checksum process, even if only a small element has changed. This may or may not be a problem, depending on the processing power of your Rsync server.

Using a NAS device as a data host

Many dedicated NAS devices offer built-in support for Rsync. While this can be convenient to set up, many of these devices use low-powered processors which can result in reduced performance if you are backing up large files (several GB or larger in a single file). The example below illustrates the difference in backup time for a dedicated QNAP NAS, versus an ordinary desktop Linux machine. The initial backup is a single 18.8GB file. The second backup consists of about 200MB or changes to that file.

DEVICE	**QNAP TS-209II with Rsync**	**Ubuntu 9.04 desktop with Rsync**
Initial backup	7 hours 55 minutes	1 hours 22 minutes
Second backup	4 hours 57 minutes	0 hours 35 minutes

Considerations for data

Seeding

When your backup job is first set up, you should *seed* your data on the data host. Use removable media to physically transport the data, or if you are using a NAS host, run the job once over a local network. For more information, see the Rsync backup management section of this whitepaper.

Single-Instance store

File Protection backups cannot use single-instance store when the backup is saved on a ReFS formatted destination. This means all of the data will be backed up each time the backup job runs.

Backup source & frequency

Run your Rsync job regularly. Regular daily interval backups will ensure that you keep your data transfer to a minimum and your data up-to-date.

Use Rsync to back up data straight from the file system. This will make sure that the data is in the smallest data blocks, resulting in the fastest possible backup.

Simultaneous backups

With Rsync, simultaneous connections may become unreliable with heavy transfer loads. It is therefore recommended that you limit connections to your own server to 5 at any one time. Depending on data storage requirements and the bandwidth speeds available, you may increase this number with caution.

Preservation of file attributes

Because Rsync works on top of the Cygwin Unix emulation layer, it does not recognize Windows file attributes (e.g. read-only, hidden), NTFS security attributes (i.e. access control lists), NTFS alternate data streams or file creation times. The only file system attribute preserved when using Rsync to transfer data is the Last modified time attribute.

BackupAssist's implementation of Rsync overcomes this limitation by having the option to store NTFS metadata on the backup destination. This option is enabled in the *Manage* screen under *Rsync options*. This is checked by default for new jobs created in BackupAssist v7. If enabled, NTFS streams and security data will be saved to a separate file on the destination and then added back to the file as part of the restore process, when using the BackupAssist Restore Console. So while these attributes are not "preserved" on the files backed up to your Rsync destination, they will still be restored.

This table outlines what attributes are preserved with the NTFS metadata option:

File attributes at destination	Preserved
Windows File Attributes	✗
Creation time	✗
Last access time	✗
Last modified time	✓
NTFS security (Access Control Lists)	✓
NTFS alternate data streams (ADSs)	✓

Using Rsync for files and directories

Rsync performs best when working directly on the file system, backing up normal files and directories. Rsync does not perform nearly as well synchronizing backup files offsite.

Below is an example of how Rsync performs:

- File system with 50,000 files, 50 GB total
- 50 files of total size 50 MB have changed

Rsync is able to identify which of the 50 files have changed, and for those files, it determines the in-file deltas. It calculates checksums on 50MB of data, and can complete the backup in a matter of minutes. The amount of data transferred will be around 20MB for typical documents.

The file system is backed up via Windows Imaging, which results in a 50GB .vhd file.

Rsync will detect that the single .vhd file has changed, and needs to determine the in-file deltas. It needs to calculate checksums on 50GB of data, which may take hours. Additionally, we have found that even if the underlying file system changes very little, about 10% of a .vhd file changes from day to day and needs to be transferred. So, about 5GB will be transferred.

We see here that it is greatly preferable in terms of bandwidth and CPU time the operate Rsync on the underlying file system rather than a backup of that file system.

File size and the number of files

In theory, there is no limit to the number of files or directories that you can Rsync. Even though Rsync only transfers the data that has changed on a day to day basis, it still must read all of the data in the file set to check which data has changed. This makes Rsync internet backups a disk/CPU intensive operation that can take longer and longer the more your data grows, no matter how little data has actually changed. We recommend that wherever possible, you use one of the other backup methods provided in BackupAssist (such as BackupAssist's File Archiving) to regularly archive infrequently used data, so the amount of actual data in day to day use is minimized.

We have run tests on several different file systems – a typical file system of 70,000 files and 24 GB with fewer than 50 MB of daily changes can be synced in around 10 minutes. The largest file system we've tested is of 200,000 files and 100 GB, which took 20 minutes to sync minimal changes.

Data compression and encryption my data

BackupAssist supports encryption and compression on the server. BackupAssist for Rsync offers industry standard encryption for data stored on the data host. This means that your data is safe "in the cloud", making external hosting a safe and secure option. Your files are also automatically compressed on the Data Host, which reduces the amount of disk space used on your hosting company.

Rsync for BackupAssist uses four types of compression:

- Effective transfer compression by only sending changed data.
- All data packets are compressed and encrypted during transfer.
- Single Instance Store (SIS) uses hard link technology to prevent the same files from being stored more than once across backups on your host.
- The source data is encrypted and compressed in an Rsync-friendly way before transmission, effectively minimizing the space used by files on the server even further.

Note: If you enable or disable encryption for an Rsync job, BackupAssist will need to re-seed the backup to the host with a full set of data (i.e. the next backup will be a full backup).

Note: Data compression has a significant performance impact when encrypting your files for Rsync.

6. BackupAssist settings

When creating a backup job, there are some global settings that should be configured in BackupAssist. If they are not configured, you will be prompted to complete them during the creation of your first backup. It is recommended that this is done in advance.

BackupAssist's settings can be entered and modified using the selections available in the **Settings tab.** Clicking on the *Settings tab* will display the selections as icons. Four of these are used when creating new a backup job and each one is described below:

Backup user identity

Backup jobs require an administrator account with read access to the data source, and full read-write access to the backup's destination. It is recommended that a dedicated backup account is created for this purpose. The account's details are entered here and your backup jobs will be launched using these credentials. The account's permissions will be validated both when the backup user identity is entered and when the job is executed. If no account is specified or the account has insufficient permissions, the backup job will fail and note the error in the backup report.

A video explaining the creation of a backup user identity can be found on our, Videos Webpage.

Email server settings

This menu item is used to enter the details of the SMTP server used by BackupAssist to send email notifications. The SMTP server must be configured if you want to have an email *Notifications* step enabled when you create a backup job.

Email address list

This menu item is used to define and store the email addresses of potential notification recipients. The list will be used to populate the recipient selection screen when configuring an email notification for a backup job. Any email addresses entered during the creation of a new notification are automatically added to the *Email address list*.

Network paths

This option allows you to enter access credentials for networks, domains and drives that the default account (specified in the *Backup user identity)* does not have access to. Enter or browse to the location and add it to the *Path list*. The *Edit* option will allow you to enter an authentication account, specifically for that path. When you create a backup job to a remote location, that location will be automatically added here.

Having multiple connections to a resource using the same logon credentials can generate a Windows error, such as the BA260 NAS error. It is therefore recommended that you avoid having mapped shares on the computer running BackupAssist that are the same as the paths configured in BackupAssist.

7. Creating a File Protection backup using Rsync

The following instructions describe how to create a File Protection backup job using Rsync. The configurations include Rsync host connections for both windows and Linux systems.

Launch BackupAssist and follow the steps outlined below:

1. Select the **Backup** tab, and click **Create a new backup Job**

2. Select **File Protection**

   If this is the first time you have created a backup job, you will be asked to provide a *Backup user identity* if one has not been defined. See the section above, BackupAssist settings, for guidance.

3. **Selections:** The selections screen is used to select the data and applications that you would like to back up. Any VSS applications detected will be displayed here as application directory containers.

   An Exchange VM Detection tab will be available if you are backing up an Exchange VM guest.

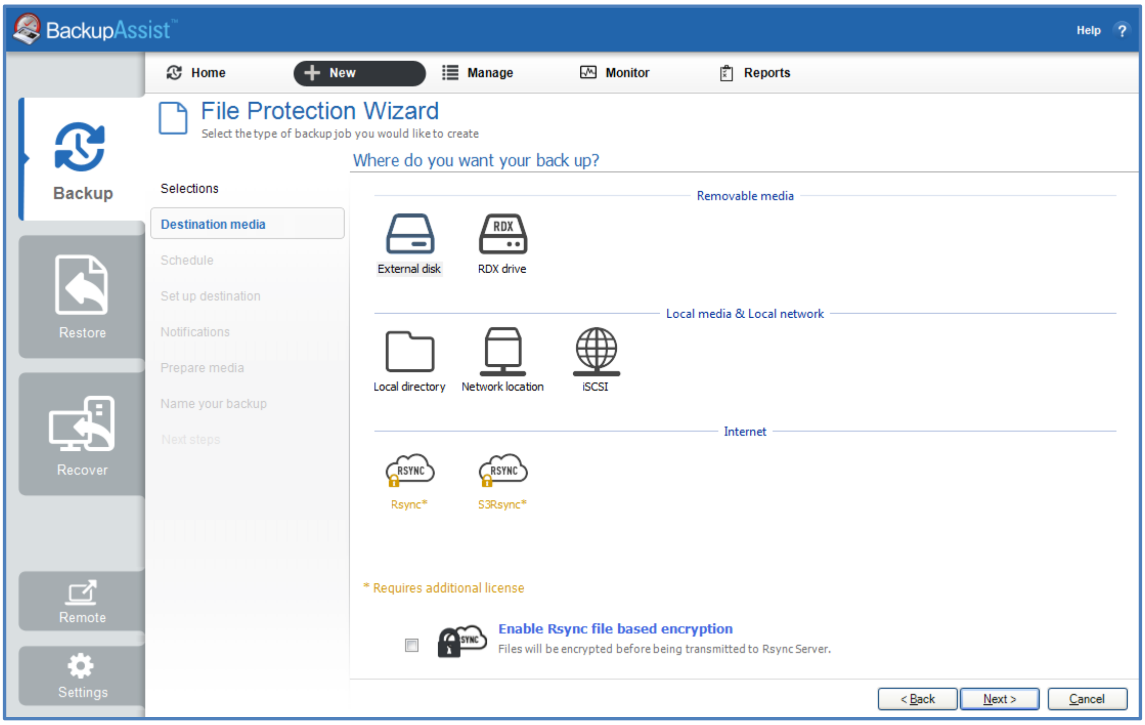
   Select the volumes, folders, files and applications that you want to back up, and click **Next.**

4. **Destination media**: The destination screen is used to select the type of media that you want to back up your data up to. This step's name will change to "Rsync", when you click next.

   Select **Rsync** or **S3Rsync** for your backup destination, and click **Next.**

   The *S3Rsync* option is for backups to Amazon S3 via the s3rsync.com service.

   Select **Enable Rsync file based encryption** if you want the backup data to be encrypted before being transmitted.



Select the type of backup job you would like to create

Where do you want your back up?

* Requires additional license

□ Enable Rsync file based encryption
Files will be encrypted before being transmitted to Rsync Server.

Figure 1: File Protection backup – Rsync destination selection

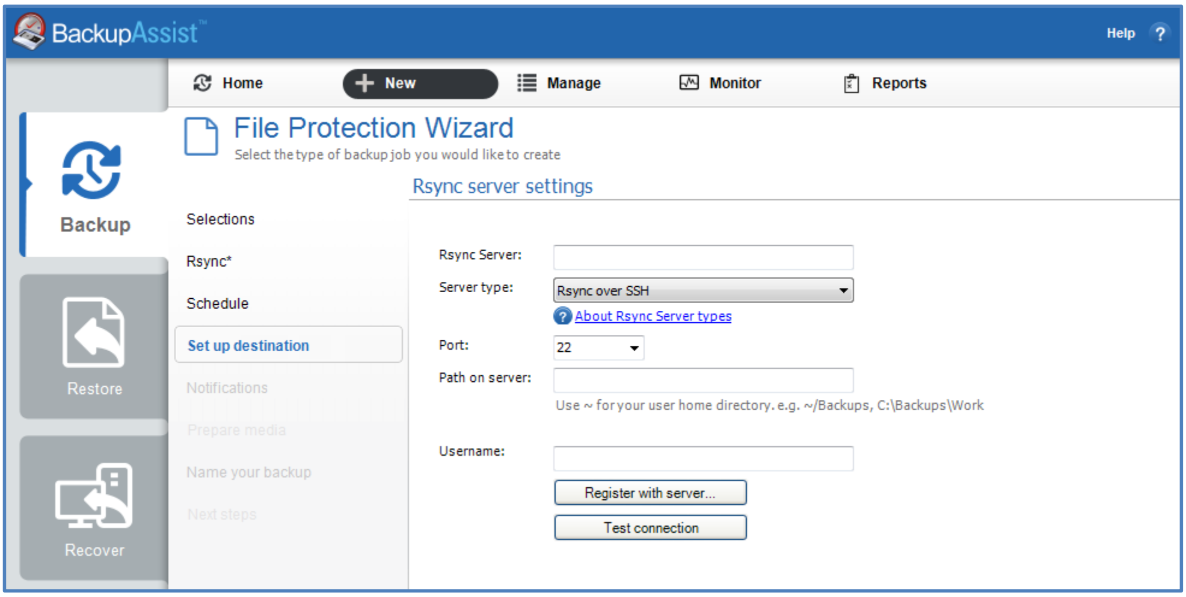
5. **Schedule:** This screen is used to select when and how you would like the backup job to run, and how long you would like the backup to be retained for. A selection of pre-configured schedules, called schemes, will be displayed.

   - The schemes available will depend on the type of destination media selected in step 4.
   - Clicking on a scheme will display information about the schedule used.
   - The schedule can be customized after the backup job has been created.

   For more information about creating custom schedules, refer to the Backup tab whitepaper.

6. **Set up destination**. The screen is used to configure your Rsync destination. The configuration screen displayed will depend on whether *Rsync* or *S3Rsync* was selected.

   IF the standard **Rsync** *Destination* was selected, follow the guidelines below:



File Protection Wizard

Select the type of backup job you would like to create

Rsync server settings

Rsync Server:

Server type: Rsync over SSH

Port: 22

Path on server:

Use ~ for your user home directory. e.g. ~/Backups, C:\Backups\Work

Username:

Figure 2: BackAssist File Protection – Rsync destination selection

a. **Rsync Server:** Enter your Rsync server name (or IP address).

b. **Server Type:** Select *Rsync over SSH*, *Rsync Daemon* or *Rsync Daemon over SSH tunnel*.

c. **Port:** The default port will display for the server type selected.

d. **Path on server:** It is best to use a new, empty directory for this path. The parent directory must exist although the sub directories will be created when the job is first run: /parent/sub_directory/.

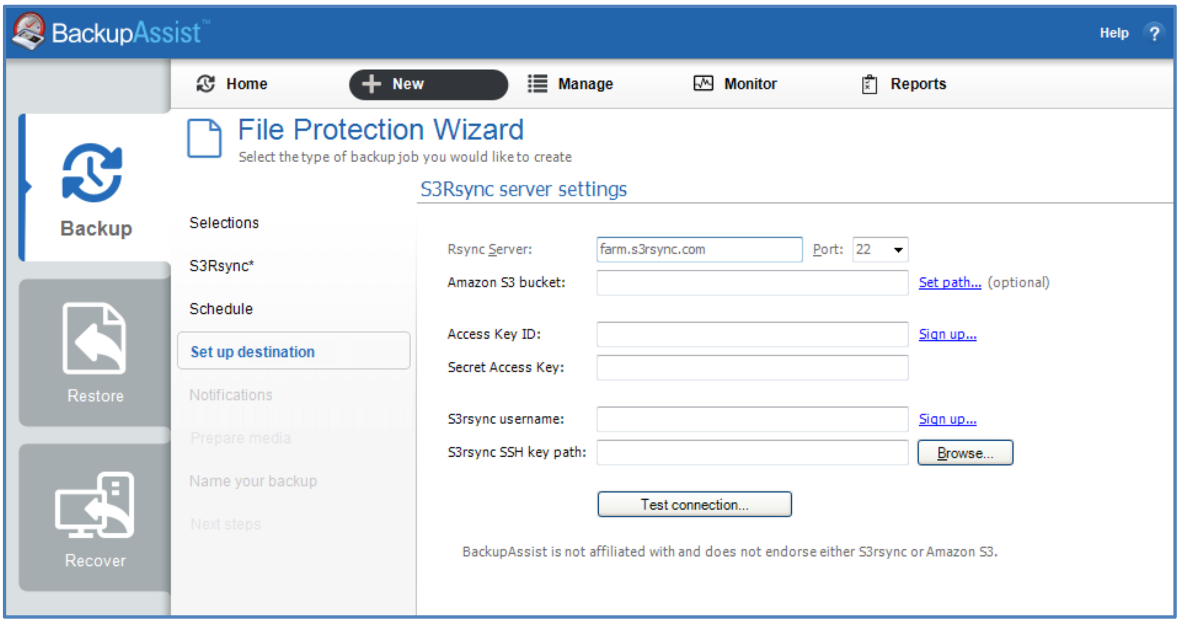
   - If your data host is running **Windows**, you can enter a normal Windows path here, such as “C:\Backups”. You can also enter a path relative to the user’s home directory by starting with a tilde (e.g. “~/Backups”).
   - If your data host is running **Linux**, you can use an absolute path by starting with a slash or a path relative to the user’s home directory by starting with a tilde (e.g. “~/Backups”).

e. **Username:** Enter the username that was activated while setting up your Rsync host.

f. **Register with server:** Select this option and you will be prompted to enter the password. BackupAssist will then create a public/private key pair to authenticate you to the data host.

g. **Test connection:** Click to test your connection to the Rsync server. If this step fails but the registration succeeded, it is probably that the *Path on server* cannot be accessed.

IF the **S3Rsync** *Destination* was selected, follow the guidelines below:



Rsync Server: farm.s3rsync.com Port: 22

Amazon S3 bucket:

Access Key ID:

Secret Access Key:

S3rsync username:

S3rsync SSH key path:

BackupAssist is not affiliated with and does not endorse either S3rsync or Amazon S3.

Figure 3: BackAssist File Protection – S3Rsync destination selection

a. **Rsync Server**: This should be farm.s3rsync.com (the default setting) unless you have been advised otherwise by s3rsync.com.

b. **Port**: This should be 22.

c. **Amazon S3 bucket**: You can leave this blank unless you want to set up multiple backup jobs using the same bucket (not recommended).

d. **Set Path**: Specify any folders you have created in the bucket.

e. **Access Key ID**: Your S3 Access Key ID.

f. **Secret Access Key**: Your S3 Secret Access Key.

g. **S3rsync username**: Your username supplied by s3rsync.com (note: this is different to your Amazon username).

h. **S3Rsync SSH key path**: The location of the saved SSH key file provided by S3rsync.com.

i. If you selected *Enable Rsync file based encryption*, you will be prompted to create a password.

> **Note:** It is important that you keep a copy of your password in a safe place, as we cannot retrieve passwords if they are lost or forgotten.

For information on configuring S3Rsync, see the Third Party data host: setting up S3Rsync section of this whitepaper.

For information on configuring Amazon S3 go to our blog post

Once you have set up your **Rsync destination**, click **Next**

- **Mail Server**: If you have not configured an SMTP mail server for BackupAssist, you will be prompted to provide those details after the backup destination step has been completed. See the BackupAssist settings section for guidance.

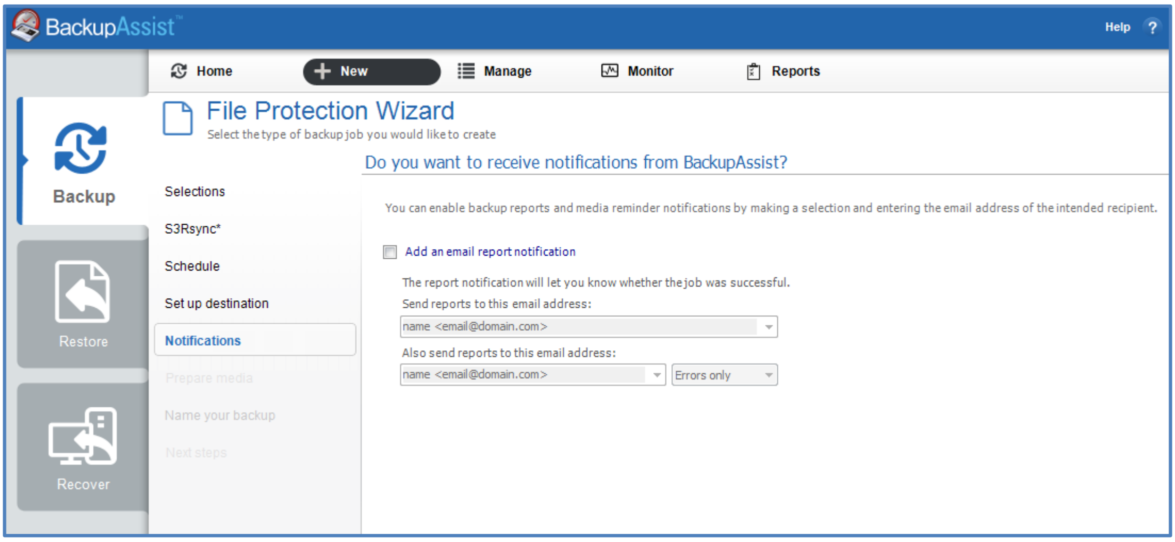
7. **Notifications**: Once a backup job has completed, BackupAssist can send an email to inform selected recipients of the result. This email notification can be enabled during the creation of a backup job, if the mail server has been configured.

   To enable email notifications:

   a. Select, **Add an email report notification.**

   b. Enter recipients into the **Send reports to this email address** field.

   c. Enter recipients into the **Also send reports to this email address** field. You can then select the condition under which the email should be sent, using the drop-down box.



File Protection Wizard

Select the type of backup job you would like to create

Do you want to receive notifications from BackupAssist?

You can enable backup reports and media reminder notifications by making a selection and entering the email address of the intended recipient.

☐ Add an email report notification

The report notification will let you know whether the job was successful.

Send reports to this email address: name <email@domain.com>

Also send reports to this email address: name <email@domain.com> Errors only

Figure 4: File Protection - Notifications setup

   After the backup job has been created, you can modify the notifications by adding and removing recipients, setting additional notification conditions and including print and file notification types.

   To learn more about notification options, see the BackupAssist Backup tab whitepaper.

8. **Prepare media:** This step will be skipped because Rsync backups do not use removable media.

9. **Name your backup:** Provide a name for your backup. Click **Finish**.

The File Protection with Rsync backup job has now been created.

Important: Once a backup job has been created, it should be reviewed and run using the *Manage* menu. This menu provides additional options to configure your backup. See the section, File Protection using Rsync backup management, for more information.

Important: Once a backup job has been run and a backup created, a MANUAL test restore should be performed to ensure the backup is working as intended. To perform a test restore, refer to the section, Restoring from a File Protection backup.

8. Restoring from a File Protection backup

This section provides instructions on how to restore data that was backed up using BackupAssist's File Protection using Rsync.

To restore data from a **File Protection** backup, start BackupAssist and follow these steps:

1. Select the **Restore tab**

   The *Restore tab* has a *Home page* and a *Tools menu*. The *Home page* is the default screen and the recommended starting point for performing a restore. The *Tools menu* should only be used by experienced administrators or users being assisted by technical support.

2. From the **Home page**, select the type of restore you want to perform. When you select one of the restore categories provided, BackupAssist will locate the corresponding backups for you.

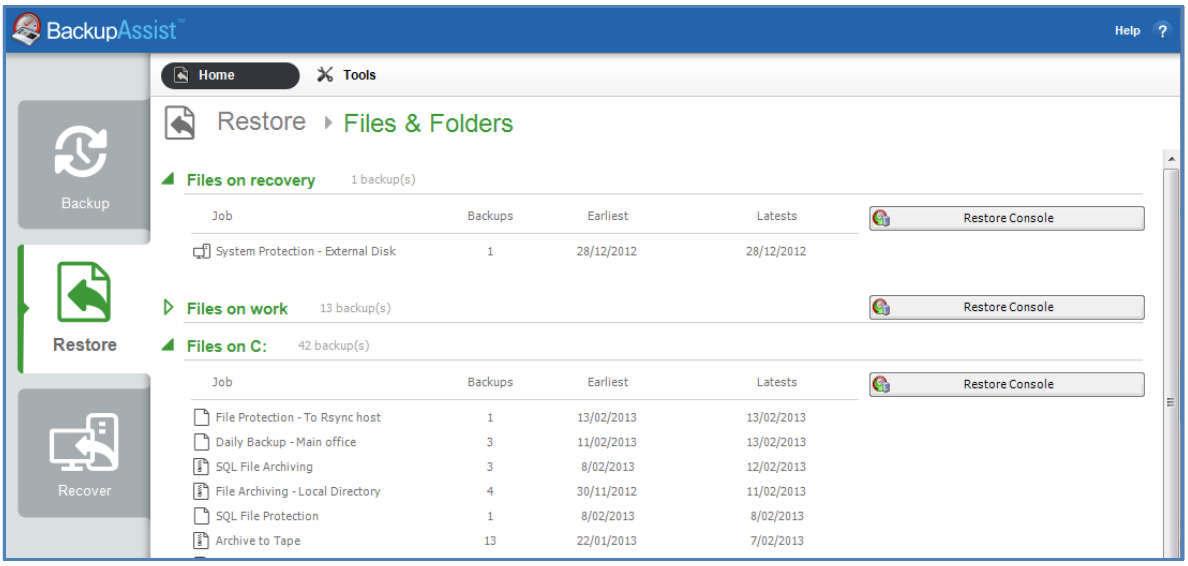
   - *Files and folders* will display all data backups and all VSS application backups.
   - *Applications* will display backups that contain VSS applications, and exclude data only backups.
   - *Exchange*, *SQL* or *Hyper-V*, will display all backups that contain the selected application. Selecting an application type will display application specific restore tools (e.g. Hyper-V Granular Restore and SQL Restore) as well as the Restore Console.

3. Once you have selected the type of restore you want to perform, the *Home page* will display all backups catalogued by BackupAssist that match your selection. The backups will be grouped by the backup's source location, and by the restore tool that can be used.

   - If a backup can be used by two restore tools, it will appear in two groupings.
   - If a backup contains data from multiple locations, it will appear in a grouping for each location.

   If your backup included both data and VSS applications, both will be available to restore once the backup has been loaded in step 4, regardless of the restore type selected.

   Select the **Restore Console.**



Files on recovery 1 backup(s)

Job	Backups	Earliest	Latests
System Protection - External Disk	1	28/12/2012	28/12/2012

Restore Console

Files on work 13 backup(s)

Restore Console

Files on C: 42 backup(s)

Job	Backups	Earliest	Latests
File Protection - To Rsync host	1	13/02/2013	13/02/2013
Daily Backup - Main office	3	11/02/2013	13/02/2013
SQL File Archiving	3	8/02/2013	12/02/2013
File Archiving - Local Directory	4	30/11/2012	11/02/2013
SQL File Protection	1	8/02/2013	8/02/2013
Archive to Tape	13	22/01/2013	7/02/2013

Restore Console

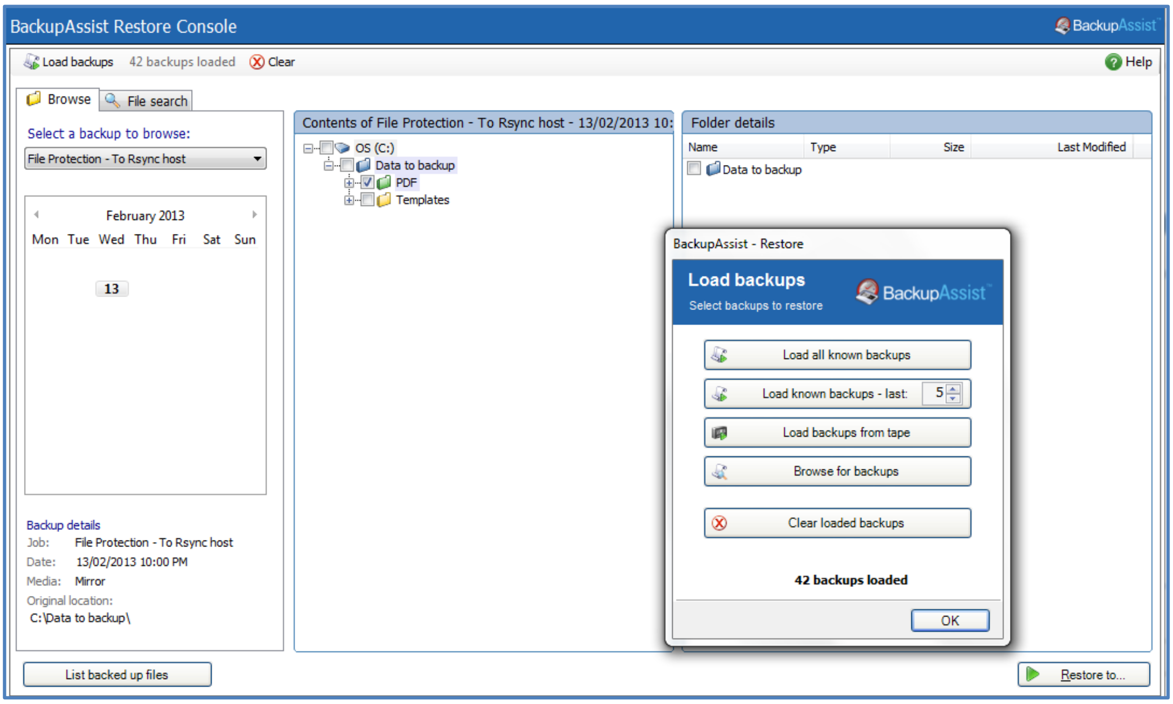
Figure 5: BackupAssist Restore Home page – selection results

4. **Restore Console – backup and data selection**

The BackupAssist *Restore Console* will open and load all of the backups that were listed on the *Home page*. The next step is to locate the data you want to restore, from the loaded backups.

The Restore Console provides two tools to locate your data:

- The **Browse** tab. Select this tab if you know the backup and date you wish to restore from, or if you need to restore an entire backup set.
    a. Use the drop-down menu to choose the backup that you want to restore from.
    b. Use the calendar to select the date you want to restore from.
    c. Use the middle panes to expand the backup set.
    d. Select the data to restore.
    e. Click **Restore to** at the bottom right of the window.
- The **Search** tab. Select this tab to search all of the loaded backups for the data you want to restore. You can display data filtered by name, date, size and type, for all backups. The results can be compared (e.g. the dates of two files) to identify the correct data selection.
    a. Enter your search term (The search accepts wild card searches, such as *.*log* or *.*doc*).
    b. Select a filter/s if required.
    c. Click the *Search* button.
    d. Select the data to restore.
    e. Click **Restore to** at the bottom right of the window.



Backup details
Job: File Protection - To Rsync host
Date: 13/02/2013 10:00 PM
Media: Mirror
Original location:
C:\Data to backup\

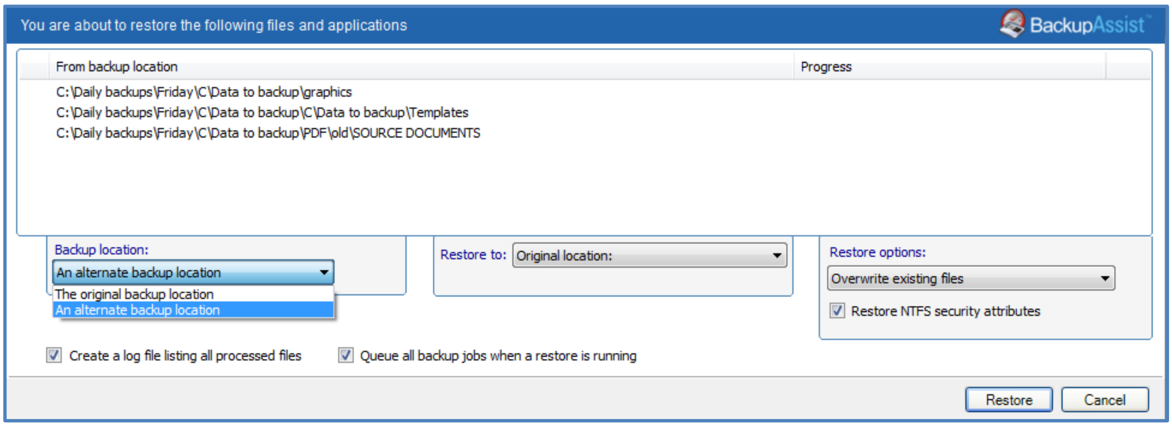
Figure 6: BackupAssist Restore Console – backup and data selection

If the backup is not present, or if you wish to load additional backups, select the **Load backups** option. Click **Load all known backups** to load all backup catalogues.

For more information about data selection, refer to the Restore tab whitepaper.

5. **Restore Console – restore destination selection**

When you select *Restore to,* a window will open showing the *Backup location,* the *Restore to* destination and the *Restore options*.



You are about to restore the following files and applications

From backup location	Progress
C:\Daily backups\Friday\C\Data to backup\graphics	
C:\Daily backups\Friday\C\Data to backup\C\Data to backup\Templates	
C:\Daily backups\Friday\C\Data to backup\PDF\old\SOURCE DOCUMENTS	

Backup location: An alternate backup location

Restore to: Original location:

Restore options: Overwrite existing files

☑ Restore NTFS security attributes

☑ Create a log file listing all processed files

☑ Queue all backup jobs when a restore is running

Figure 7: BackupAssist Restore Console – restore destination

a. Review **Backup location**.

b. Review **Restore to:** Leave the *Original location* selected or chose an *Alternative path*.

Restoring to an alternate location will use a minimal path. For example, restoring a single file to an alternate location will copy the file to the location without re-creating the original folder structure.

c. Review the **Restore options:**

- Select one of the following: *Overwrite all existing files*, *Do not overwrite existing files* or *Only overwrite older files*.
- The option, *Restore NTFS security attributes* will be selected by default.

d. Selecting *Create a log file listing all processed files*, will create a file that lists the success or failure of each file. The log is opened by selecting the log file's link in the backup report.

e. *Queue all backup jobs when a restore is running*, is selected by default.

f. Click the **Restore** button.

- The Restore Console will connect to your Rsync host and restore the selected files.
- The restore will run from the destination window and a **Report** link will appear once the restore has finished.

g. Select **Done**.

▶ **Your File Protection using Rsync restore has now been completed.**

Important: Only backups made with BackupAssist v5.3 or later will show up in the Restore Console.

Important: The Restore Console can restore encrypted files, but you will need to supply the password. It is important that you keep a copy of your password in a safe place, as we cannot assist you with opening password encrypted files if your password is lost or forgotten.

Helpful hint: These instructions explain how to restore data using the *BackupAssist Restore console*. If you do not have BackupAssist installed and need to restore a *File Protection* backup, you can manually browse the *Rsync* destination and transfer data back using any method permissible by your host.

9. File Protection using Rsync backup management

Once you have created a backup job, you can modify the settings and access advanced configuration options using the *Manage* menu..

To access the backup management screen:

1. Select the BackupAssist, **Backup tab.**
2. Select **Manage** from the top menu. A list of all backup jobs will be displayed.
3. Select the backup job you want to modify, and select **Edit.**
4. Select the required configuration item on the left. Key configurations are described below.

To learn more about the backup management options, see the Backup tab whitepaper.

Manually running a backup job

All new and modified backup jobs should be manually run to ensure they work as intended.

1. Select the backup job, and select *Run.*
2. You will be prompted to *Rerun a past backup* or to *Run a future backup now.*
3. When the backup job starts, the screen will change to the *Monitor* view.
4. Once the backup has been completed, select the *Report* button and review the results.

Rsync Data Seeding

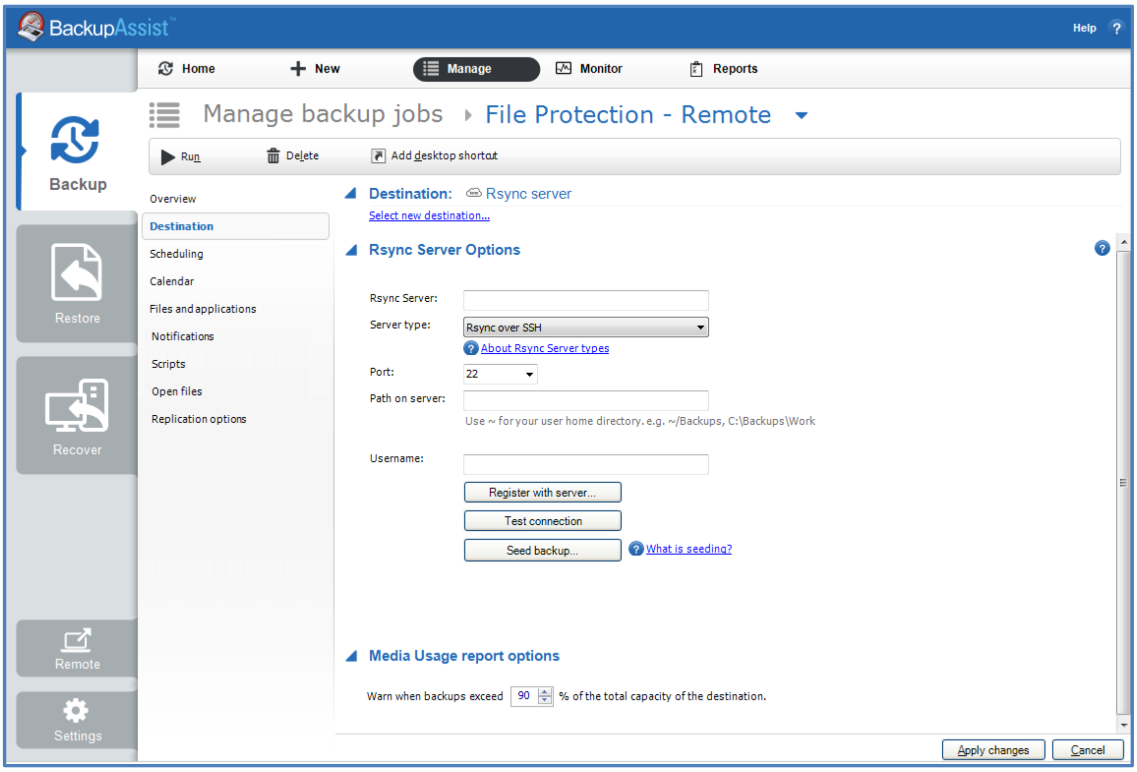
Rsync backups are incremental backups. The first time you perform your backup, no data will exist on your data host so a full backup is required. If you enable or disable encryption for an Rsync job, BackupAssist will need to *re-seed* the backup to the Rsync backup destination with a full set of data.

Seeding your backup via a slow internet connection may not be practical, so two methods are provided here to seed your data host. Once the initial seed to the data host is complete, each successive backup will be an incremental backup of data that has changed.

Option 1 – Seeding a permanently offsite data host

You can use BackupAssist to automatically seed data offsite using a removable media, which can be physically transported to the data host so the data uploaded locally. Seeding your data using this method is simple:

1. Connect a removable media device to the machine running BackupAssist.
2. Select the **Destination** menu item.
3. Click the **Seed backup** button and select the location of an empty folder on your portable media.



Destination: Rsync server

Server type: Rsync over SSH

Port: 22

Use ~ for your user home directory. e.g. ~/Backups, C:\Backups\Work

Warn when backups exceed 90 % of the total capacity of the destination.

Figure 8: Manage backup jobs screen – Destination seeding

4. Once the seed is complete, your portable media should contain:
   - A **directory** with the seeded data
   - A **README.txt** file containing instructions on how to copy the seed to your Rsync server
   - An **.sh script file**, which is used to copy your data to your Rsync server.

5. Transport the portable media containing the seed to the site where your Rsync server is located.

6. Connect the device to the Rsync server and copy the seed to it:

   For a Windows server (assuming the seed is located on E:\SeedFolder)

   a. Go to the *Start* menu > CopSSH > Start a Unix BASH shell.

   b. Enter the following command: bash "/cygdrive/e/SeedFolder/seed.sh".

   For a Linux or Unix server (assuming the seed is located in /mnt/usbdrive/SeedFolder).

   a. Run the following command in your shell: bash "/mnt/usbdrive/SeedFolder/seed.sh".

   A complete seed of your data should now be copied to your Rsync server. Each successive backup from now on will be an in-file delta incremental backup of data that has changed.

Option 2 – Bringing your data host onsite to perform the seed

This method is suitable for "standalone" data hosts (where a data host is not shared among multiple clients) that can be physically transported onsite – such as NAS devices.

Seeding your data is easy – simply follow these instructions:

1. Connect your data host to the LAN and make a note of its IP address / Hostname.
2. Create your BackupAssist Rsync job, run it at convenient time and wait for it to complete.
3. Move your NAS to its permanent location.
4. Update the job settings in BackupAssist to reflect the new IP address / Hostname.

Scheduling

Selecting *Scheduling* will display the **Scheduling options.** You can use this screen to change the default time and days of your scheme's daily backups. If you selected a scheme with archive backups (e.g. weekly, monthly), you can specify when each archive backup will run. The current scheme is shown, along with two pop-up menus: *Select a new schedule* and *Customize schedule*.

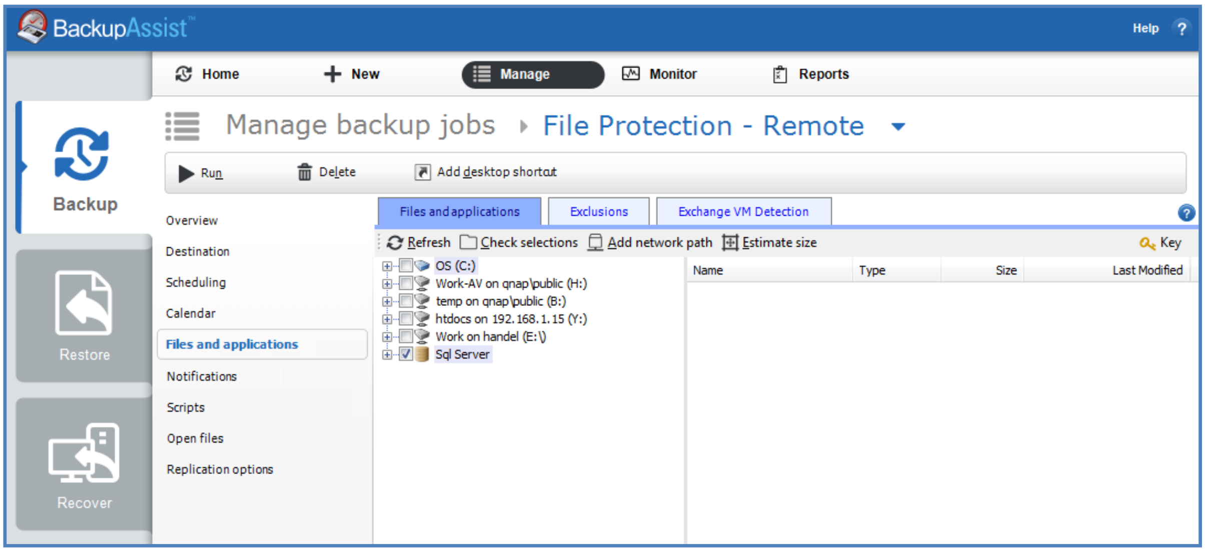
Select a new Schedule: This will display the pre-configured backup schemes that you chose from during the creation of your backup job. The selections available will depend on the type of destination media you have selected. You can select a different scheme using this option.

Customize schedule: This selection can be used to modify each backup within your current schedule. The customizations available will depend on the type of backup media used. For File Protection backups, the *Method* field can only be set to *Automatic*. This is because single instance store provides the benefit of incremental backups in a full backup format. This technology is managed by BackupAssist and does not require further modification.

Files and applications: VSS

The Volume Shadow Copy Service (VSS) is a Microsoft Service that creates a copy of an application's data (e.g. Exchange and SQL) so the data can be backed up without interfering with the application. BackupAssist is a VSS-aware backup client, so it can backup application data using the VSS copy. BackupAssist will automatically detect *locally* running VSS applications and list them for selection during the **Destination** step of the backup job creation.

VSS applications are displayed under the **Files and applications** menu item. You can modify your backup job by selecting entire VSS applications or drilling down to individual components. In some cases, only applications that are currently running will be detected. If an application is not listed, try re-starting it and then click the *Refresh* button in BackupAssist.



- ☐ OS (C:)
- ☐ Work-AV on qnap\public (H:)
- ☐ temp on qnap\public (B:)
- ☐ htdocs on 192.168.1.15 (Y:)
- ☐ Work on handel (E:\)
- ☑ Sql Server

Figure 9: Manage backup jobs screen – File and applications option

Rsync options

Select the **Rsync options** item from the left hand menu of the *Manage* jobs screen. The *Rsync options* item contains 15 different configurations for backing up your data across the internet.

10. Support and Resources

Contacting Technical Support

Should you have any questions regarding either BackupAssist or File Protection using Rsync, please email support@backupassist.com and we will respond to you as soon as possible.

Similarly, if you have any suggestions for additional functionality in BackupAssist, or new products or add-ons, please also forward your feedback to support@backupassist.com

Troubleshooting FAQ

Test connection failed: Ensure that you are able to ping your Rsync server from your BackupAssist server and that you have opened up the appropriate ports on your firewall. Make sure that the username can access the path you have specified.

SSH Connection Refused: Ensure that the services *Openssh SSHD* and *RsyncServer* are started on the data host machine (Administrative Tools > Services). Make sure your firewall is not blocking the attempt.

Register with server failed: Ensure that you have the correct username and password set up on your Rsync server.

Appendix

Data host: The server that has been set up to host backup data.

Client: The machine that BackupAssist is installed on, that sends data to the data host.

SSH Authentication: For SSH communication, we use a public / private key method of authentication, meaning that you will only be asked for your password once (when registering with the server), and your public key will be uploaded to the server, enabling BackupAssist to log into the server in the future in a secure, password-less manner. For more information on public / private key authentication, visit the following Wikipedia article: Wikipedia Public Key Cryptography

Daemon Authentication: In Daemon mode, your password is stored in an encrypted format by BackupAssist and provided every time the backup runs. When running in Daemon mode, traffic will be unencrypted. For this reason, we recommend that you only use closed network environments, such as LANs or WANs connected by a secure VPN. VPNs inherently encrypt communication between nodes, so using Rsync in Daemon mode over a VPN is still secure.

Learn more – The Welcome Screen

Each tab in BackupAssist includes a “Learn More” link on the tab’s **Home** page.

For example, selecting the ***Learn more about Backup*** link will open the **Welcome Screen** with the Backup introduction selected. This screen provides an overview of the tab’s functions and features, and links to documentation and resources.