Windows 2000 Server

Step-by-Step Guide to Encrypting File System (EFS)

Abstract

This document provides sample procedures that demonstrate the end-user and administrative capabilities of the Encrypting File System (EFS) included with the Microsoft® Windows® 2000 operating system. EFS is based on public-key encryption and takes advantage of the CryptoAPI architecture in Windows 2000.

Introduction

The Encrypting File System (EFS) included with the Microsoft® Windows® 2000 operating system is based on public-key encryption and takes advantage of the CryptoAPI architecture in Windows 2000. Each file is encrypted using a randomly generated file encryption key, which is independent of a user's public/private key pair; thereby stifling many forms of cryptoanalysis-based attack.

File encryption can use any symmetric encryption algorithm. The release of EFS uses the Data Encryption Standard X, or DESX (128 bit in North America and 40 bit International) as the encryption algorithm. Future releases will allow alternate encryption schemes.

EFS supports encryption and decryption of files stored on local drives as well as those stored on remote file servers.

Note In the case of remote servers, you can encrypt files and folders on the server but your data is not protected if you access a file over the network. Windows 2000 provides network protocols such as Secure Sockets Layer/Private Communication Technology (SSL/PCT) to encrypt data access over the network.

User Interaction

The default configuration of EFS allows users to start encrypting files with no administrative effort. EFS automatically generates a public-key pair and file encryption certificate for file encryption for a user the first time a user encrypts a file.

File encryption and decryption is supported per file or for an entire folder. Folder encryption is transparently enforced. All files (and folders) created in a folder marked for encryption are automatically encrypted. Each file has a unique file encryption key, making it safe to rename. If you rename a file from an encrypted folder to an unencrypted folder on the same volume, the file remains encrypted. However, if you copy an unencrypted file into an encrypted folder, the file remains in the state that it was in—in this case the file remains unencrypted. Command-line tools and administrative interfaces are provided for advanced users and recovery agents.

You don't have to decrypt a file to open it and use it. EFS automatically detects an encrypted file and locates a user's file encryption key from the system's key store. Since the key storage mechanism is based on CryptoAPI, in the future, users will have the flexibility of storing keys on secure devices, such as smart cards.

The initial release of EFS does not support file sharing. However, the EFS architecture is designed to allow file sharing between any number of people by the simple use of their file encryption certificates. Users can then independently decrypt files using their own private keys. Users can be added easily (if they have a configured public key pair) or removed from a group of permitted sharers.

Data Recovery

EFS provides built-in data recovery support. The Windows 2000 security infrastructure enforces the configuration of data recovery keys. You can use file encryption only if the system is configured with one or more recovery keys. EFS allows recovery agents to configure public keys that are used to recover encrypted data if a user leaves the company. Only the file encryption key is available using the recovery key, not a user's private key. This ensures that no other private information is revealed to the recovery agent.

Data recovery is intended for business environments where the organization expects to be able to recover data encrypted by an employee after an employee leaves or if file encryption keys are lost.

The recovery policy can be defined at the domain controller of a Windows 2000 domain. This policy is enforced on all computers in that domain. The recovery policy is under the control of domain administrators who can delegate this to designated data security administrator accounts using Windows 2000 directory service delegation features. This provides strong control and allows flexibility regarding who is authorized to recover encrypted data. EFS supports multiple recovery agents by allowing multiple data recovery certificates configurations. These features provide organizations with redundancy and flexibility in implementing their recovery procedures.

In the default Windows 2000 installation, when the first domain controller is set up, the domain administrator is the specified recovery agent for the domain. The way the domain administrator configures the recovery policy determines how EFS is implemented for users on their local computers. The domain administrator logs on to the first domain controller to change the recovery policy for the domain. Table 1 helps you see the effect on users of several recovery policy configurations.

Table 1 Effect of Recovery Policy Configurations on Users

Default recovery agent	Domain administrator	Administrator of local computer	No recovery agent
Effect on EFS locally	EFS is available locally	EFS is available locally	EFS cannot be used
Configuration	Recovery policy in place configured with designated recovery agent(s)	No recovery policy at the domain level	Empty recovery policy
Action by domain administrator	None required	Delete recovery policy on first domain controller	Delete every recovery agent

EFS can also be used in a home environment. EFS automatically generates recovery keys and self-signed certificates when the local administrator logs on, making the local administrator the default recovery agent. Home users can also use the command line tool to recover data using the administrator's account. This reduces the administrative overhead for a home user.

The remainder of this paper provides sample procedures that demonstrate the end-user and administrative capabilities of Windows 2000 EFS. These are intended for use when evaluating EFS for your network. Please walk through these examples sequentially.

Requirements and Prerequisites

To complete this walkthrough, you need the following:

- A client computer running Windows 2000 Professional operating system.
- A server computer running Windows 2000 Server operating system.
- A Windows 2000 Server domain controller.
- A local area network to connect these three computers.
- All three computers should be members of the same domain.

The common infrastructure assumed in this guide is covered in the Step-by-Step Guide to a Common Infrastructure Part I: Installing a Windows 2000 Server as a Domain Controller http://www.microsoft.com/technet/win2000/depprof1.asp, and Part II: Installing a

Windows 2000 Professional Workstation and Connecting it to a Domain http://www.microsoft.com/technet/win2000/depprof2.asp. If you are not using the common infrastructure, you need to make the appropriate changes to this instruction set. The computer names you will see throughout this document are based upon the common infrastructure.

- The User scenarios described in this guide should be run on a client running Windows 2000 Professional.
- The Administrative scenarios should be run on a server (not a domain controller) running Windows 2000 Server.
- The section titled, "Securing the Default Recovery Key for the Domain," should be run on a domain controller running Windows 2000 Server.

User Scenarios

Encrypting a Folder or File

When encrypting a folder or file, you can use Windows Explorer or you can use the command-line utility, Cipher.exe. Both procedures are described next. This guide assumes you are performing the User Scenario exercises on a computer running Windows 2000 Professional.

To use Windows Explorer to encrypt a folder or file

1. Click **Start**, point to **Programs**, point to **Accessories**, and click **Windows Explorer**.
2. Right-click the folder or file name you wish to work with (in this example a folder we created under **My Documents** called **Encrypted Files**), and choose **Properties**.
3. On the **General** tab in the **Encrypted Files Properties** dialog box, click **Advanced**.

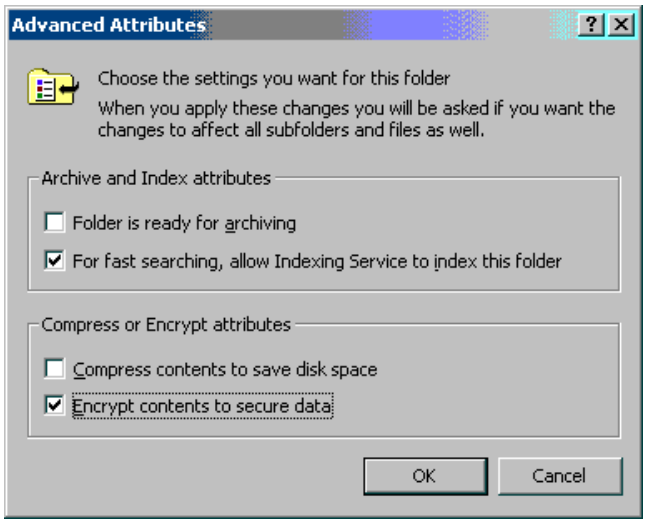

Figure 1 Advanced attributes

4. On the **Advanced Attributes** dialog box, select **Encrypt contents to secure data** and click **OK**. This returns you to the **Encrypted Files Properties** dialog box.
5. Click **OK** in the **Encrypted Files Properties** dialog box.
6. You are asked to choose between encrypting the folder and all its contents or just the folder itself. If the folder is empty, choose to encrypt the folder only; otherwise, choose the folder and its contents, and click **OK**.
7. A dialog box shows you the status of encrypting the folder or file. Click **OK** again to make this change, and close the snap-in.

Decrypting a Folder or File

As with encryption, you can use Windows Explorer or a command-line utility to decrypt a folder or file. Both procedures are described next. Note that you do not need to decrypt a file to open the file and edit it. Decrypt a file that you want to make accessible to others.

To use Windows Explore to decrypt a folder or file

1. Click **Start**, point to **Programs**, point to **Accessories**, and select **Windows Explorer**.
2. Right-click the folder or file name, and choose **Properties**.
3. On the **General** tab of the **Properties** dialog box, click **Advanced**.
4. On the **Advanced Attributes** dialog box, clear the **Encrypt contents to secure data** check box, and click **OK**.
5. Click **OK** in the **Encrypted Files Properties** dialog box.
6. You are asked to choose between decrypting the folder and all its contents or just the folder itself. The default is to decrypt the folder only, and then click **OK**.

Note It is recommended that you encrypt folders and not individual files. This is because many existing applications are not aware of encryption and can therefore render the file in clear text.

To use Cipher.exe to encrypt a folder or file

1. To encrypt the folder, **D:\Encrypted Files** (substitute this with the drive letter and folder that you are working with), click **Start**, click **Run**, type **cmd** and click **OK**. For example, at the command prompt, type:

```
D:\>cipher /e /s:"D:\Encrypted Files"
```

2. Press **ENTER**.

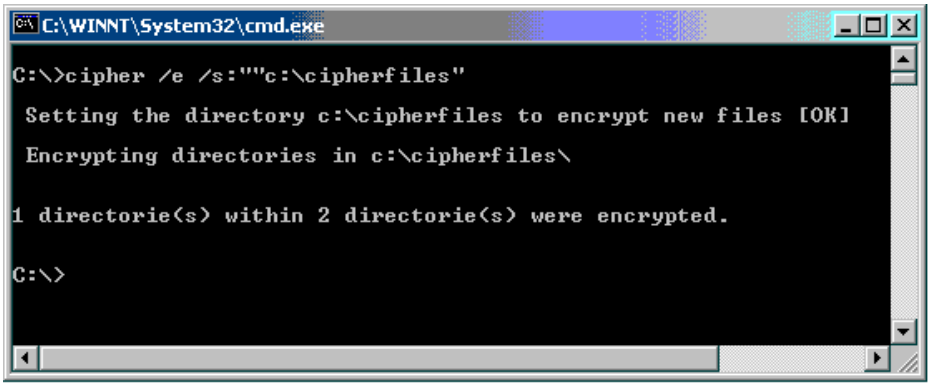

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Figure 2 Cipher command

The folder's attributes report that this folder is encrypted.

To use Cipher.exe to decrypt a folder or file

1. To decrypt the folder, D:\Encrypted Files, type

   ```
   C:\>cipher /d /s:"C:\Encrypted Files"
   ```

2. Press **Enter**.

Using an Encrypted File or Folder

If you are the user who encrypted a file, you can use that file as before. You can open, edit, copy, and rename the file. If you are *not* the user who encrypted the file, you cannot do any of those things and you receive an *Access Denied* error message if you attempt to access the file. Only the user who encrypted the file can decrypt it—making it available again to others in its unencrypted (plain text) form.

With an encrypted folder, if you had access to that folder before it was encrypted, you can still open it. Folders are only marked as encrypted so that all files in them are encrypted as they are created, and sub-folders are marked encrypted at creation.

Note An encrypted folder can be decrypted only by the user who encrypted it.

Copying an Encrypted Folder or File

The following explains the procedures and limitations for copying encrypted folders or files on the same volume and from one volume to another.

- **To copy a file or folder on the same computer from one NTFS partition in a Windows 2000 location to another NTFS partition in a Windows 2000 location**. Copy the file or folder as you would an unencrypted file. Use Windows Explorer or the command prompt. The copy is encrypted.
- **To copy a file or folder on the same computer from an NTFS partition in a Windows 2000 volume to a FAT partition**. Copy the file or folder as you would an unencrypted file. Use Windows Explorer or the command prompt. Because the destination file system does not support encryption, the copy is in clear text.
- **To copy a file or folder to a different computer where both use the NTFS partitions in Windows 2000**. Copy the file or folder as you would an unencrypted file. Use Windows Explorer or the command prompt. If the remote computer allows you to encrypt files, the copy is encrypted; otherwise it is in clear text. Note that the remote computer must be trusted for delegation; in a domain environment, remote encryption is not enabled by default.
- **To copy a file or folder to a different computer from an NTFS partition in a Windows 2000 location to a FAT or NTFS in a Windows NT® 4.0 location**. Copy the file or folder as you would an unencrypted file. Use Windows Explorer or the command prompt. Because the destination file system does not support encryption, the copy is in clear text.

Note If your original file was encrypted, Microsoft recommends that you use the File Properties, Advanced option to confirm the status of the destination file.

Moving or Renaming an Encrypted Folder or File

The following explains the procedures and limitations for moving encrypted folders or files on the same volume and from one volume to another.

- **To move or rename a file or folder within the same volume**. Move the file as you would an unencrypted file. Use Windows Explorer, the context menu, or the command prompt. The destination file or folder remains encrypted.
- **To move a file or folder between volumes**. This is essentially a copy operation. Review the previous section, *Copying an Encrypted Folder or File.*

Deleting an Encrypted Folder or File

If you have access to delete the file or folder, you can delete it as you could an unencrypted file.

Note Deleting an encrypted folder or file is not restricted to the user who originally encrypted the file.

Backing Up an Encrypted Folder or File

The following explains the procedures and limitations for backing up encrypted folders or files.

Backing up by copying. Backup created using the **Copy** command or menu selection can end up in clear text, as explained previously in the section, Copying an Encrypted Folder or File. **Backing up using Backup in Windows 2000 or any backup utility that supports Windows 2000 features**. This is the recommended way to back up encrypted files. The backup operation maintains the file encryption, and the backup operator does not need access to private keys to do the backup; they only need access to the file or folder to complete the task.

To use Backup to back up a file, folder, or drive

1. Click **Start**, point to **Programs**, point to **Accessories**, point to **System Tools**, and then click **Backup**. The **Backup** wizard appears.
2. Click the **Backup** tab.
3. Select the drive, files, or folders that you want to back up. (in this case **My Documents\Encrypted Files**).

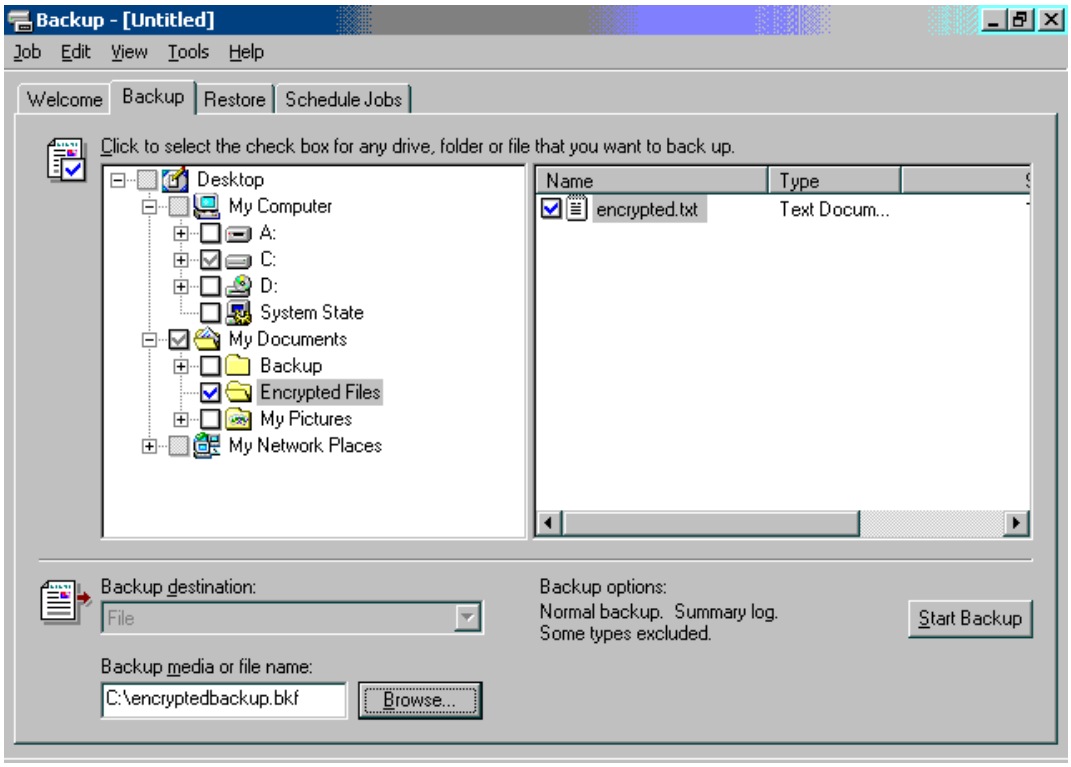

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Figure 3 Backup file selection

4. Select the destination in the Backup media or file name list. Click **Browse** to locate a pre-existing backup file.
5. Click **Start Backup**.
6. In the **Backup Job Information** dialog box, make selections, and then click **Start Backup**. When the backup process is complete, click **Close** in the **Backup Progress** dialog box.

Backup backs up the entire encrypted file, folder, or drive to the backup file you selected. This file can be copied to FAT media, such as floppy disks, and is secure because its contents remain encrypted.

Restoring an Encrypted File or Folder

Restore operations parallel those used for backing up encrypted files. The following explains the procedures and limitations for restoring backed up encrypted files to the computer where the backup was performed and to a computer other than the one where the files were backed up.

Restoring by Copying. Restored files created using the **Copy** command or menu selection can end up in clear text, as explained previously in the section, Copying an Encrypted Folder or File. **Restoring using Backup in Windows 2000 or any backup utility that supports Windows 2000 features**. This is the recommended way to restore encrypted files. The restore operation maintains the file encryption, and the restoring agent doesn't need access to private keys to restore the files. After the restoration is complete, the user with the private key can use the file normally.

To use Backup to restore a file on the same computer

1. Click **Start**, point to **Programs**, point to **Accessories**, point to **System Tools**, and then click **Backup**.
2. Click the **Restore** tab.
3. Right-click **File**, and then click **Catalog file**.
4. Enter the path to the backup file (for example, **C:\Encryptedbackup.bkf**).
5. Check the encrypted folder that needs to be restored. All its contents are restored automatically. In the **Restore files to** list, select **Alternate location**.

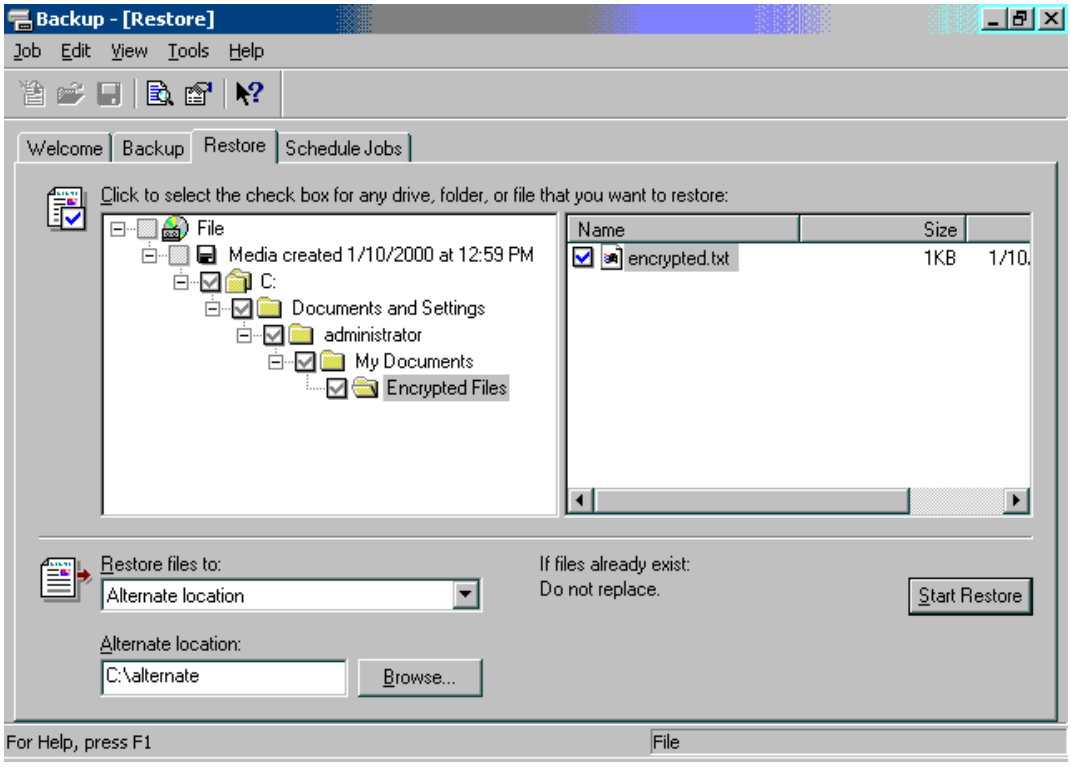

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Figure 4 Restore window

6. In the **Alternate location** box, provide the name of the folder where you want the encrypted material to be restored.
7. Click **Start Restore**.
8. Click **OK** to confirm the restore process.
9. Click **OK** to confirm the backup file. When the restore process is complete, click **Close**.

   The **Restore Progress** dialog shows you the progress of the operation. You can use the **Properties** of the folder to check that indeed it was restored encrypted.
10. Close the **Backup** window.

Restoring Files to a Different Computer

If you want to be able to use encrypted files on a computer other than the one the files were encrypted on, you need to ensure that your encryption certificate and associated private key are available on the other system. You can do this either by using a **Roaming Profile** or by manually moving your keys.

- **Using a Roaming Profile**. Request that your administrator set up a roaming profile for you if you don't already have one. Once you have a roaming profile, the encryption keys you use are the same on all computers that you sign on to with that user account. Note that even if you use roaming profiles, you may want to back up your encryption certificate and private key. However, if you do lose the keys that enable you to decrypt a file, you can request the designated *recovery agent* (by default the local or domain administrator) to recover your encrypted files.
- **Manually moving keys**. Before you contemplate moving your keys manually, you should back up your encryption certificate and private key. You can then restore your certificate and key on a different system.

To back up your encryption certificate and private key

1. To start the Microsoft Management Console (MMC), click **Start**, click **Run**, type **mmc** in the Open box, and click **OK**.
2. On the **Console** menu, click **Add/Remove snap-ins**, and click **Add**.
3. Locate the **Certificates** snap-in, and click **Add**. Select **My user account** and then click **Finish**. Click **Close**. Click **OK**.
4. Locate the **Encrypting File System** certificates in your Personal certificate store. Click the **+** next to **Certificates–Current User**. Expand the **Personal** folder. Click **Certificates**.
5. Right-click your certificate, click **All Tasks**, and click **Export**. This starts the **Certificate Manager Export** wizard. Click **Next**.
6. Click **Yes, export the private key**. Click **Next**.
7. The export format available is **Personal Information Exchange-PKCS#12**, or .pfx—personal exchange format. Click **Next**.
8. Provide the password to protect the .pfx data. Click **Next**.
9. Provide the path and file name where the .pfx data is to be stored. In this case, type **c:\mykey**. Click **Next**.
10. A list of certificates and keys to be exported is displayed. Click **Finish** to confirm.
11. Click **OK** to close the wizard, and close the snap-in.

This exports the encryption certificate and private key to a .pfx file that must be backed up securely.

To restore your encryption certificate and private key on a different system

1. Copy the .pfx file to a floppy disk, and take it to the computer where you want to import the encryption certificate and private key.
2. Start the **Certificates** snap-in by clicking **Start**, clicking **Run**, and then typing **mmc**.
3. On the **Console** menu, click **Add/Remove snap-ins**, and click **Add**.

4. Click **Certificates**, and click **Add**. Select **My user account** and then click **Finish**. Click **Close**. Click **OK**.
5. Right-click **Personal store**, click **All Tasks**, and click **Import** to import the .pfx file.
6. This starts the **Certificate Manager Import** wizard. Follow the wizard steps to successfully import the certificate and private key.
7. Provide the path to the .pfx file. In our example, it is c:\mykey.pfx.
8. Type the password to unwrap the .pfx data.
9. Click **Place all certificates in the following store**, and accept the Personal certificate store. Click **Next**.
10. Click **Finish**, and then click **OK** to start the import operation. When the import is complete, click **OK** to close the wizard.

Once you have the same keys available, you can transparently use encrypted files that may have been backed up on different computer.

Folders and Files On a Remote Server

You can transparently encrypt and decrypt files and use encrypted files stored on a remote server. This works whether you access those files remotely or log on to the other computer locally. However, you must remember that when you move encrypted files using backup and restore mechanisms, you must ensure that the appropriate encryption certificate and private keys are also moved to allow you to use the encrypted files in their new destinations. Without correct private keys, you cannot open or decrypt the files.

Note If you open the encrypted file over the network, the data that is transmitted over the network by this process is not encrypted. Other protocols, such as Secure Sockets Layer/Personal Communication Technology (SSL/PCT) or Internet Protocol Security (IPSec) must be used to encrypt data over the wire.

Administrative Scenarios

Securing the Default Recovery Key on a Stand-alone Computer

For this set, logon as Administrator to the local computer (in our example, this is the machine named **HQ-RES-SRV-01**), a member server. Be sure you logon to the computer locally (as opposed to logging onto the domain).

As part of the local administrator's initial logon, a default recovery policy is set up on each stand-alone computer. This policy makes the local administrator the default recovery agent for the computer.

To change this policy

1. Click **Start**, click **Run**, and type **MMC** in the **Open** box. Click **OK**.
2. Click **Console**, click **Add/Remove Snap-In**. Click **Add**.
3. Click **Group Policy** and click **Add**.
4. Accept the default of **Local Computer** and click **Finish**. Click **Close** and click **OK**.
5. Click the **+** next to **Local Computer Policy** to expand it. In the same way, expand **Computer Configuration**, **Windows Settings**, **Security Settings**, **Public Key Policies**, and then click **Encrypted Data Recovery Agents**. Your screen should look something like the one below.

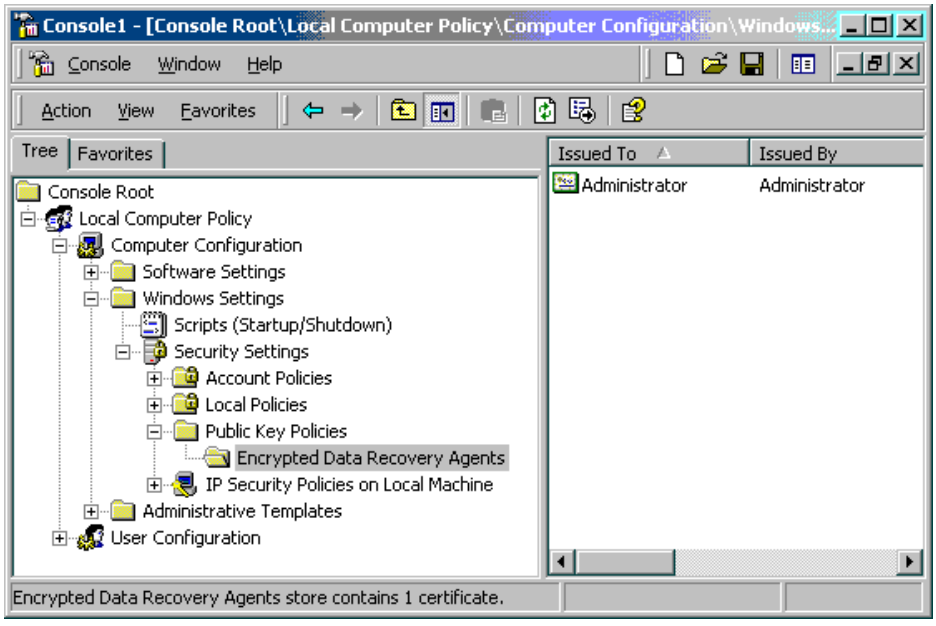

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Figure 5 Encrypted data recovery agents

6. You see a self-signed Administrator certificate in the policy. This makes the local administrator account the default recovery agent. If you delete this certificate, you have an empty recovery policy, which turns EFS off. EFS doesn't allow encryption of data if there are no recovery agents set up.
7. To protect the recovery key associated with this certificate, click **Console**, and click **Add/Remove snap-ins**. Click **Add**.
8. Click **Certificates**, and click **Add**. Click **Current User**. Click **Finish**. Click **Close**. Click **OK**.
9. Click the **+** next to **Certificates–Current User**. In the same way, expand the **Personal** folder. Click **Certificates** in the left pane.
10. Click **Administrator** in the right pane and scroll to **Intended Purposes**. This should be set to **File Recovery**. Use the procedure in the section, Restoring Files to a Different Computer, to export the certificate and private key in a .pfx file.
11. After you have created the .pfx file, delete the certificate and the private key associated with it from the Personal store. This ensures that the only copy of the key is in the .pfx file. To do so, click **Administrator** in the right pane and then click the red **X** on the toolbar. You will receive a warning message saying that you will not be able to decrypt data encrypted using this certificate. Click **Yes** to continue.

12. Secure the .pfx file in a safe or locked cabinet. This file should be used only when a file needs to be recovered.

Securing the Default Recovery Key for the Domain

As with the stand-alone computer, a default recovery policy is configured for the domain when the first domain controller is set up. The default recovery policy uses a self-signed certificate to make the domain Administrator account the recovery agent.

Note To change the default, log on as Administrator on the first domain controller of the domain, and follow the steps above to secure the recovery key for the domain.

Requesting a File Recovery Certificate

If you decide to use the default recovery policies, you never need to request a file recovery certificate. However, in circumstances where multiple recovery agents are needed for the domain or where the recovery agent needs to be different from the domain administrator due to legal or corporate policy, you may need to identify certain users as recovery agents, and these users must be issued file recovery certificates.

To accomplish this, the following procedures must be completed:

- An Enterprise Certificate Authority (CA) must be set up, if one isn't available. (See also Step-by-Step Guide to Setting up a Certificate Authority).
- The policy on the Enterprise CA must allow the designated user/agents to request and obtain a file recovery certificate.
- Each user must request a file recovery certificate.

To set up an Enterprise CA

1. Log on to the first domain controller in the domain as the domain administrator. In our example, this entails logging onto the computer **HQ-RES-DC-01** in the **RESKIT.COM** domain.
2. Click **Start**, point to **Settings**, and select **Control Panel**.
3. Double-click **Add/Remove Programs**
4. Click **Add/Remove Windows Components**.
5. Click **Certificate Services.** You will receive a warning that once Certificate Services are installed, the computer cannot be renamed and the computer cannot join or be removed from a domain. Click **Yes** to continue. Click **Next**.
6. Make sure the **Enterprise root CA** radio button is selected and click **Next**.
7. Fill in the properties as shown below.

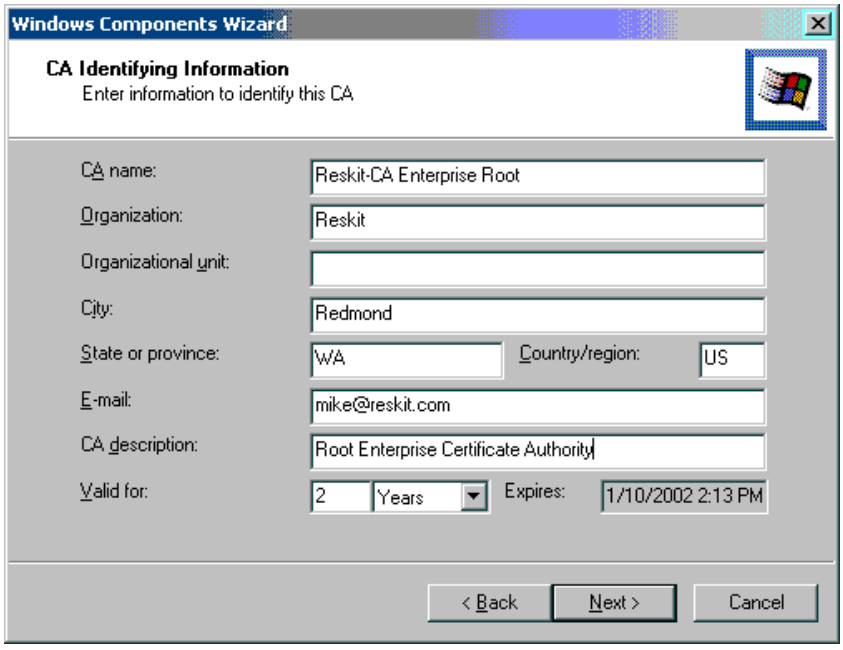

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Figure 6 CA identifying information

8. Click **Next**. Click **Next** to accept the default data storage location.
9. If IIS is running, you are prompted whether to temporarily shut that service down. Click **OK**.
10. You may be prompted to insert the Windows 2000 Server CD-ROM; unless you are installing from a network source insert the CD-ROM or provide the path to the network source. Click **OK** to proceed.
11. After the component has installed, click **Finish**. Close the **Add/Remove Programs** and **Control Panel**.

To create a policy for users designated as recovery agents

1. Click **Start**, point to **Programs**, point to **Administrative Tools**, and click **Active Directory Computers and Users**.
2. Right click **Groups**, click **New**, click **Group**, type **Domain Recovery Agents** and click **OK**.
3. To add users to that group, right-click **Domain Recovery Agents** in the right pane, click **Properties**, click the **Members** tab.
4. Click **Add**, click **Administrator**, and click **Add**. Click **OK** twice. Close the **Active Directory Computers and Users** snap-in.

Add the Domain Recovery Agents group to the EFS Recovery Template.

This procedure allows users in that group to request recovery certificates.

1. Click **Start**, point to **Programs**, point to **Administrative Tools**, and click **Active Directory Sites and Services**.

2. On the **View** menu, click **Show Services**.
3. Click the **+** next to **Services** in the left pane. Use this method to expand the **Public Key Services** folder.
4. Click **Certificate Templates** (in the left pane).

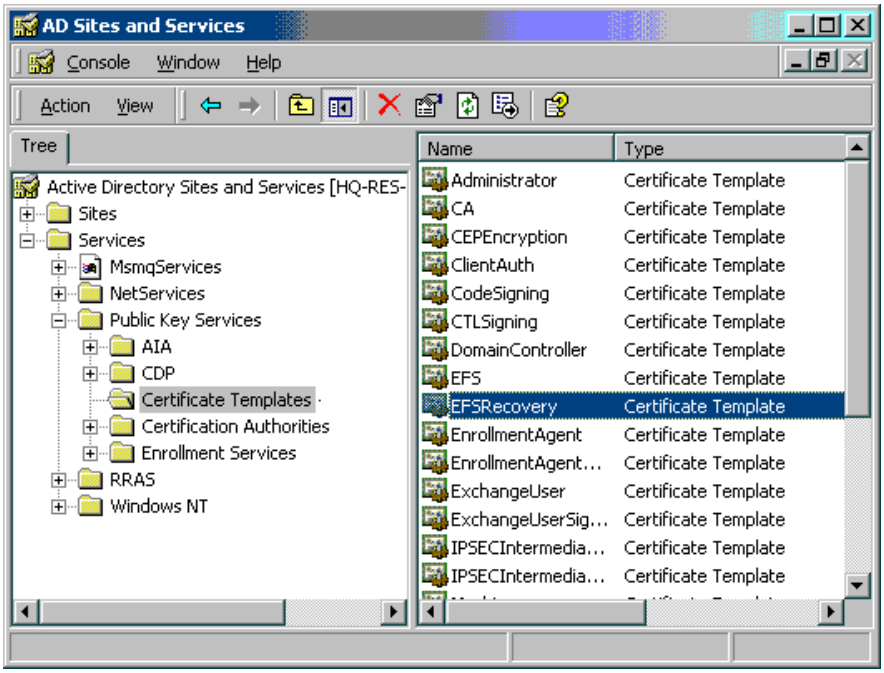

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Figure 7 Certificate templates

5. Double-click **EFSRecovery** in the right pane.
6. Click the **Security** tab.
7. Click **Add**. Scroll to the group **Domain Recovery Agents**. Click **Domain Recovery Agents** and click the **Add** button. Click **OK**.
8. With **Domain Recovery Agents** selected in the top pane, select the **Enroll** check box in the bottom pane.
9. Click **OK**, and close the **Active Directory Sites and Services** snap-in.

Note For more information on administering Certificate Services, refer to the document, Step-by-Step Guide to Administering Certificate Services.

To request a file recovery certificate

1. Start the **Certificates** snap-in by clicking **Start**, clicking **Run**, and then typing **mmc**.
2. On the **Console** menu, select **Add/Remove snap-**ins, and click **Add**.
3. Click **Certificates**, and click **Add**. Select **My user account** and then click **Finish**. Click **Close**. Click **OK**.
4. Click the **+** next to **Certificates–Current User**.
5. Right-click **Personal** in the left pane, click **All Tasks**, and click **Request New Certificate**. This starts the **Certificate Request** wizard.
6. The first page of the wizard is informational. Click **Next** to continue.
7. A list of certificate templates is displayed. Click **EFS Recovery Agent**, and click **Next**.
8. Type in a friendly name that you can use to distinguish this certificate from others. Add a description if you desire. Click **Next**.
9. The next page shows you the summary of your choices. Click **Finish** to obtain the certificate.
10. Click **Install Certificate** and then click **OK**.

You have now obtained a file recovery certificate. At this point, you need to do two things:

- Copy the certificate without the private key to a .cer file. You need to do this only if the certificate is not automatically published in the directory, in order to enable the domain administrator to add it to the recovery policy.
- Export this certificate with the private key to a secure .pfx file.

To copy the certificate to a .cer file

1. Click the **+** next to **Certificates** under Personal in the left pane (unless it is already expanded.)
2. In the right pane, right-click the certificate you just created.
3. Click **All Tasks** and click **Export**. This starts the **Certificate Export** wizard as described previously in this document. Click **Next** to begin the export process.
4. Click **No, do not export the private key** and click **Next**.
5. Choose the default **.cer** file format, and click **Next**.
6. Provide the file path, and click **Next**.
7. Click **Finish** to perform the export, and then click **OK**.

To export the certificate to a secure .pfx file

1. Follow the steps outlined in the section Restoring Files to a Different Computer.
2. Remember to delete the certificate and the private key from your store after you have exported it to a .pfx file. This key is highly sensitive, as it can decrypt any encrypted file where the recovery policy is in effect.

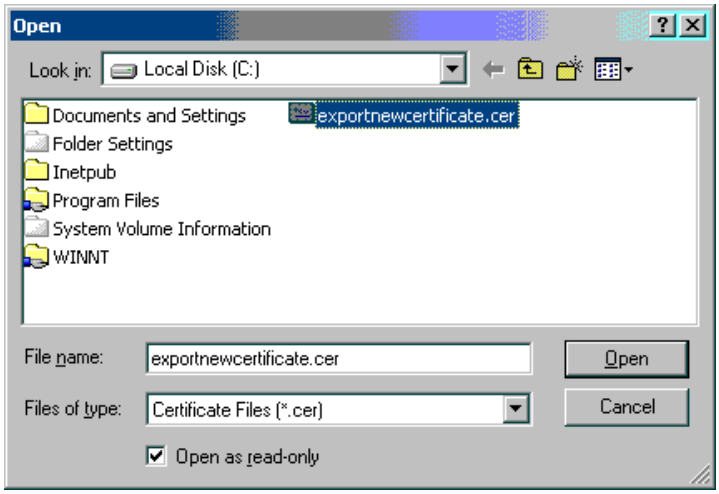
3. Close the **Certificate** snap-in.

Setting Up a Recovery Policy for the Entire Domain

Once recovery agents have been identified and issued certificates, the domain administrator can add these certificates to the recovery policy, as described next.

To add certificates to recovery policy

1. Click the **Start** button, point to **Programs**, point to **Administrative Tools**, and then select **Domain Security Policy**.
2. Click the **+** next to **Security Settings**.
3. Click the **+** next to **Public Key Policies**.
4. Click **Encrypted Data Recovery Agents**. Now right-click it and click **Add**. The **Add Recovery Agent** wizard starts. Click **Next**.
5. Click **Browse Folders**.
6. Click the certificate that was created in the previous steps, **exportnewcertificate.cer**, and click **Open**.

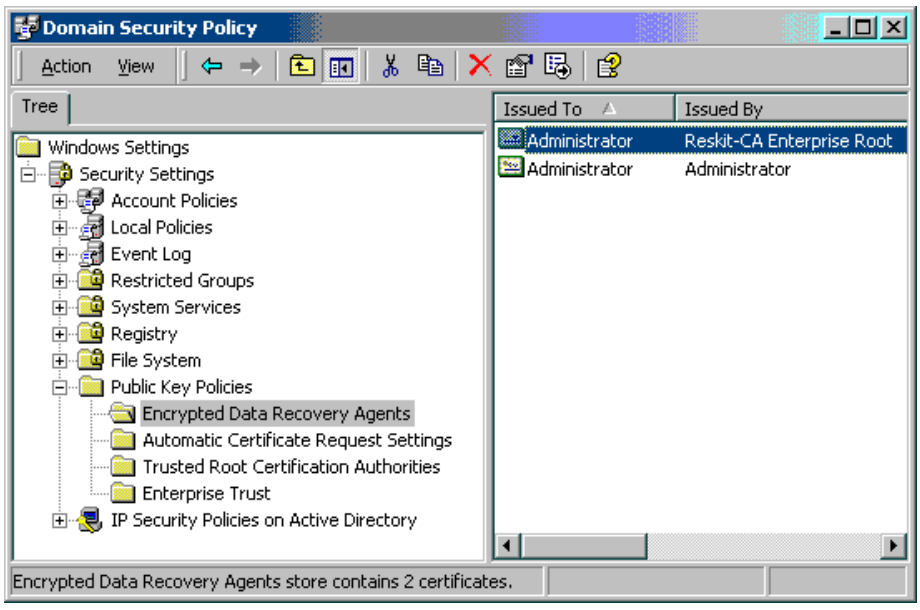


If your browser does not support inline frames, click here to view on a separate page.

Figure 8 Select certificate from folder

7. Click **Next**, and then click **Finish**.

The new certificate now appears in the right pane of the **Domain Security Policy** snap-in.



If your browser does not support inline frames, click here to view on a separate page.

Figure 9 New certificate

Setting a Recovery Policy for a Specific Organizational Unit

You may be required to establish a unique recovery policy for a subset of computers in your domain. You can accomplish this by using the Group Policy infrastructure. To do this, repeat the steps described above for an organizational unit (OU) rather than a domain node.

In the case of an OU, you do not have a default Group Policy Object that you can simply edit. Therefore, you need to click **Add** in the **Group Policy** dialog box to add a new GPO.

Once you have added the new GPO, use **Edit** to start the **Group Policy** snap-in and then follow the same steps as above to define a different recovery policy for that OU.

Recovering a File or Folder

Recovery agents may need to recover files or folders if a user loses his or her key or leaves the company, or if there is a legal requirement to do so. The process of recovery is similar to decryption once the recovery key is available on the system.

To recover a file or folder

1. Back up the files or folder to a .bkf file from the system where they currently exist. For complete procedures, see the section, Backing Up an Encrypted Folder or File.
2. Copy the .bkf file to the secured recovery agent's computer. To do this, you can use removable media such as floppy disk, or you can email the .bkf file to the recovery agent.
3. The recovery agent should restored the files or folder in the .bkf file locally on a secured system. For complete procedures, see the section, Restoring an Encrypted Folder or File.
4. Use the **Certificates** snap-in to import the recovery key and certificate from the .pfx file to the secured system. See Restoring an Encrypted Folder or File for the import procedure.
5. Once the recovery key is imported into the context, you can simply open each file, or you can use the Windows Explorer **Properties** dialog box to decrypt individual files or entire folders.
6. Once the decryption is complete, the recovery agent can recreate the .bkf file, this time containing decrypted files and folders, and mail it back to requestor.

Disabling EFS for a Specific Set of Computers

In some cases, you may need to ensure that a stand-alone computer or some computer in an OU (in Active Directory) has EFS disabled. The best way to disable EFS is to set an empty recovery policy. You can do this locally on the computer using the local Group Policy snap-in or by defining a GPO at the OU level with an empty recovery policy.

Note There is a difference between an empty policy and no policy. In Active Directory where the effective policy is an accumulation of Group Policy Objects defined at various levels in the directory tree, the absence of a recovery policy at higher-level nodes (for example, at the domain node) allows policies at a lower level to take effect. An empty recovery policy at higher-level nodes disables EFS by providing no effective recovery certificates. On a given computer (stand-alone or joined to the domain), an effective policy must have at least one valid recovery certificate to enable EFS on that computer. Therefore, on a given computer, the absence of a recovery policy or an empty recovery policy has the same effect—EFS is disabled.

More Information

For the latest information on Microsoft Windows 2000 network operating system, visit our World Wide Web site at http://www.microsoft.com/windowsserver2003/default.mspxand the Windows NT Server Forum on the Microsoft Network (GO WORD: MSNTS) the Windows 2000/NT Forum at http://computingcentral.msn.com/topics/windowsnt.

Windows 2000 Web Site Resources

Exploring Security Services
http://www.microsoft.com/windows2000/guide/server/features/securityscvs.asp

Windows 2000 Planning and Deployment Guide
http://www.microsoft.com/technet/win2000/dguide/home.asp
