Centrify Isolation and Encryption Service

Centrify Isolation and Encryption Service Administrator's Guide

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Centrify Corporation

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About this guide

This Isolation and Encryption Service Administrator’s Guide provides information for installing, configuring, and troubleshooting Centrify Isolation and Encryption Service. Centrify Isolation and Encryption Service enables you to manage IP Security Policies on UNIX computers using Active Directory group policies. The IP Security Policies protect sensitive information by isolating trusted computers on the network and enabling end-to-end encryption of data in motion.

Intended audience

This guide is intended for network administrators who are responsible for securing communication between trusted computers. The guide assumes that you have a functioning IP Security policies configured for at least one Windows domain. If you do not have IP Security policies configured or are unfamiliar with how to configure Active Directory group policies, you should consult the documentation provided by Microsoft. If you are familiar with Active Directory group policies, group policy objects, and how to configure and apply IP Security policies on Windows computers, this guide notes where isolation and encryption service IP Security policies differ from the policies defined on Windows.

Using this guide

Depending on your environment and role, you may want to read portions of this guide selectively. The guide provides the following information:

- How Centrify Isolation and Encryption Service supports IP security provides an overview of IP security policy and how Centrify Isolation and

Encryption Service uses the policies defined in Active Directory to provide IP Security on UNIX computers.

- Installing the isolation and encryption service on UNIX lists the operating system and platform requirements and describes how to install Centrify Isolation and Encryption Service software on UNIX computers to enable IP security policy features.
- Configuring the isolation and encryption service summarizes the steps for configuring Active Directory group policies that implement IP Security Policies.
- Troubleshooting the isolation and encryption service and IP Security Policies explains how to use the `adsec` tool to troubleshoot the isolation and encryption service implementation of IP security policy on a UNIX computer.
- Configuring a Linux server for DirectAccess explains how to add a Linux server to a Microsoft Windows DirectAccess Test Lab configuration.
- Configuring a Certificate Authority for auto-enrollment explains how to set up a Certificate Authority to support PKI authentication for Centrify Isolation and Encryption Service.

In addition to these chapters, an index is provided for your reference.

Documentation conventions

The following conventions are used in Centrify documentation:

- `Fixed-width` font is used for sample code, program names, program output, file names, and commands that you type at the command line. When *italicized*, this font indicates variables. Square brackets (`[ ]`) indicate optional command-line arguments.
- **Bold** text is used to emphasize commands or key command results; buttons or user interface text; and new terms.
- *Italics* are used for book titles and to emphasize specific words or terms. In fixed-width font, italics indicate variable values.
- Standalone software packages include version and architecture information in the file name. Full file names are not documented in this

guide. For complete file names for the software packages you want to install, see the distribution media.

- For simplicity, UNIX is used to refer to all supported versions of the UNIX and Linux operating systems. Some parameters can also be used on Mac OS X computers.

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For access to documentation for all Centrify products and services, visit the Centrify documentation portal at docs.centrify.com. From the Centrify documentation portal, you can always view or download the most up-to-date version of this guide and all other product documentation.

For the most up to date list of known issues, please login to the Customer Support Portal at http://www.centrify.com/support and refer to Knowledge Base articles for any known issues with the release.

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How Centrify Isolation and Encryption Service supports IP security

This chapter provides an introduction to IP security policy for Windows computers and how Centrify Isolation and Encryption Service extends IP security to protect network traffic on other platforms. The chapter includes an overview of isolation and encryption service architecture to help you identify the components involved in the application of IP security policies.

Introduction to IP security for Windows computers

Internet Protocol security (IPsec) is a low-level protocol for authenticating and encrypting network traffic. The protocol uses cryptographic services to protect communications, encrypting each packet of data that is transmitted over Internet Protocol (IP) networks. The IPsec protocol also supports the establishment of mutual authentication of the beginning of a communication session and ensures the data integrity of transferred during a session.

In an Active Directory environment, IPsec services are deployed and managed through Microsoft IP Security Policies. An administrator configures IP Security Policies through one or more Group Policy Objects (GPO). The administrator can then apply the settings in the Group Policy Objects to a site, domain, or organizational unit.The Windows domain computers then automatically manage their IP security based on the rules defined in the Group Policy Object.

Applying IP security policies to other platforms

With the Centrify Centrify Isolation and Encryption Service, you can use the same approach for applying IP security policies on non-Windows computers as you do on Windows computers. If you have the DirectControl agent for *NIX installed on an operating system that is supported for the isolation and encryption service, you simply install the DirectSecure agent for *NIX on the Centrify-managed computer and use the Windows group policies to configure the IP security rules for the Centrify-managed computer in the same way you do for Windows computers. After you define the rules and apply through a Group Policy Object, Centrify-managed computers automatically manage their IP security based on those rules.

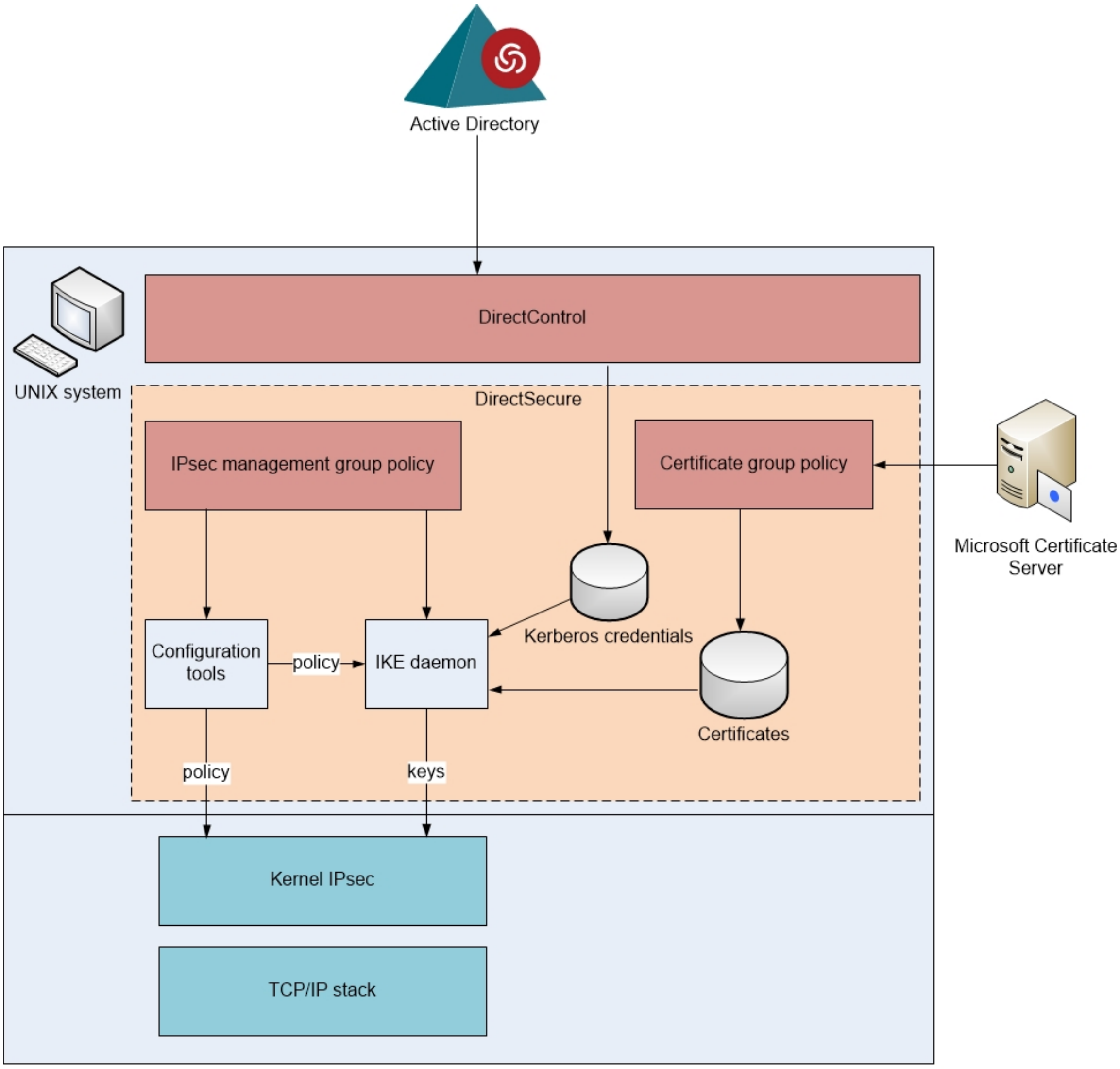
How Centrify Isolation and Encryption Service uses native and Windows IPsec components

The functionality associated with Internet Protocol security (IPsec) is built into the kernel of all the operating systems that support Centrify Isolation and Encryption Service. However, manually configuring IP security on those platforms using their native IPsec services can be very difficult. To avoid this complexity, Centrify Isolation and Encryption Service leverages the robust IP Security Policies available on Windows computers.

On Windows, IP security is managed through Active Directory group policies. You use the Group Policy Management Editor to add filters and rules for IP security and deploy those filters and rules to computers through Group Policy Objects. The isolation and encryption service maps the IP Security Policies defined in Active Directory to the native IPsec infrastructure on the non-Windows computers you are managing.

A key component of the IPsec infrastructure is the Internet Key Exchange (IKE) daemon. Most operating systems provide an IKE daemon by default, and the isolation and encryption service provides an IKE daemon for platforms that do not have one. The IKE daemon negotiates key exchanges with the IKE daemon on other computers using the rules and filters you specify. For Centrify Isolation and Encryption Service, these rules and filters are controlled using group policies and command-line utilities.

The following figure illustrates the Centrify Isolation and Encryption Service architecture.



Supported authentication modes for the isolation and encryption service

Centrify Isolation and Encryption Service supports authentication using the following authentication methods.

Kerberos authentication

For Kerberos authentication, Centrify Isolation and Encryption Service relies on the DirectControl agent for *NIX. The Centrify agent provides a Kerberos environment that enables existing Kerberos applications to authenticate transparently with Active Directory. For more information about the Centrify agent and the implementation of Kerberos for Linux and UNIX computers, see the *Administrator's Guide for Linux and UNIX*.

Pre-shared key authentication

Microsoft Windows stores pre-shared keys in Active Directory. If a computer is configured with IP Securities Policies that use pre-shared keys for authentication, all of the information for the keys is downloaded when the computer joins a domain. For example, for the `racoon` IKE daemon, the pre-shared key information is stored in the file `/etc/centrifydc/racoon/psk.conf`, which is protected with `root` file permissions.

Note Microsoft recommends using pre-shared keys for testing only. For production environments, you should use PKI or Kerberos V5, both of which are supported by Centrify Isolation and Encryption Service.

Public Key Infrastructure (PKI) authentication

Microsoft Windows provides a Public Key Infrastructure (PKI) that Centrify Isolation and Encryption Service uses to obtain certificates and install them on Centrify-managed computers that are joined to a domain.

DirectSecure agent for *NIX supports the use of certificates that use an RSA algorithm or an Elliptic Curve Cryptography (ECC) algorithm.

Note Certificates that use the Elliptic Curve Cryptography (ECC) algorithm can be used for IPsec authentication between UNIX computers or between Windows computers. ECC certificates aren't supported yet for IPsec authentication between a UNIX computer and a Windows computer.

For an overview of how to configure the Microsoft Windows PKI components required for PKI authentication, see How to configure the Public Key Infrastructure on Windows. For an overview of how the isolation and encryption service uses the certificate auto-enrollment feature to make certificates available to Centrify-managed computers, see How Centrify Isolation and Encryption Service uses certificates and auto-enrollment.

For more detailed instructions on how to configure PKI components for the isolation and encryption service, see Configuring a Certificate Authority for auto-enrollment

How to configure the Public Key Infrastructure on Windows

Before you can use PKI authentication with the isolation and encryption service, you must configure the appropriate components on Windows computers. For example, the isolation and encryption service requires an Active Directory domain controller to be configured as the Certification Authority (CA) server for the Active Directory forest. Other certificate issuers are not currently supported.

The following steps summarize the process for configuring PKI on Windows:

1. Identify an Active Directory domain controller to act as the **Certificate Authority** for the enterprise.

   Active Directory services must be available on the computer that issues certificates.

2. Install **Internet Information Services** (IIS) and **Certificate Services** on the domain controller.

   - Microsoft Internet Information Services (IIS) handle Certificate Revocation List (CRL) requests made by the isolation and encryption service and provide the virtual directories required to issue and manage certificates.

   - Certificate Services are required to enable the computer to act as a Certificate Authority (CA) and issue certificates to other computers. The Application server role, which installs IIS, and the Certificate Services server role must be on the same computer.

3. Add a trusted root certificate to the group policy.

   To establish a chain of trust for the PKI environment, you must identify an entity, such as the root CA, as a trust anchor. You can establish the CA as a trust anchor by adding the CA's root certificate to the **Trusted Root Certification Authorities** container in the group policy object that defines the IP Security Policies.

4. Enable auto-enrollment for the group policy.

   If you specify auto-enrollment for public key policies, computers associated with the group policy object automatically enroll for certificates.

5. Create a certificate template with auto-enrollment permission and assign it to the CA.

   You must create a certificate template and assign it to a CA. The CA generates certificates to be downloaded by the isolation and encryption service based on the certificate template you assign. This template must have auto-enrollment permission enabled.

How Centrify Isolation and Encryption Service uses certificates and auto-enrollment

The Centrify Isolation and Encryption Service makes the certificates required for PKI authentication available to Centrify-managed computers through the auto-enrollment and certificate templates.

Microsoft Windows stores certificate templates in a global location in Active Directory. When a computer joins a domain, the isolation and encryption service locates the templates in Active Directory. For each template that is configured for auto-enrollment, the isolation and encryption service determines whether a certificate has been issued and installed on the joined computer, and if not, contacts the Certificate Authority (CA) using Kerberos credentials to obtain one.

During this process, the isolation and encryption service checks the certificates that have already issued to make sure they are still valid—that is, the certificates have not expired and have version numbers that match their related certificate template—and requests them to be reissued, if needed.

By default, the isolation and encryption service installs the certificate, its private key, and the certificate trust chain in the following directory:

```
/var/centrify/net/certs
```

The isolation and encryption service uses the trust chain to extract the CA root certificates and installs them in a location where the IKE daemon can read them (`/var/centrify/net/certs` by default).

The isolation and encryption service downloads the Certificate Revocation List (CRL) from the CA server to identify certificates that are no longer valid. The isolation and encryption service also fetches CRLs based on the CRL URLs in any certificates it needs to check as part of a key exchange negotiation with another computer.

In addition to using CRLs, the isolation and encryption service uses the Online Certificate Status Protocol (OCSP), to determine the status of a certificate.

Note Centrify Isolation and Encryption Service supports sending and receiving PKCS7 certificate bundles, which are useful in a multi-tiered Certificate Authority infrastructure. For example, a computer only needs to be configured to trust the root CA because the PKCS7 bundle allows the computer to follow the chain from the certificate to the root authority.

IP Security Policies not supported by the isolation and encryption service

IP security supports two modes of network connections: tunnel and transport. Tunnel is typically used to implement VPN functionality and is not supported by the Centrify Isolation and Encryption Service. The isolation and encryption service only supports transport mode, which is used for host-to-host communications.

There are also a few Windows-specific IP security policy settings that are not implemented by Centrify Isolation and Encryption Service. However, the differences between Windows IP Security Policies and the isolation and encryption service IP security implemented are minor. In most cases, you can create the same filters and apply the same rules for non-Windows computers that you can for Windows computers.

Note The isolation and encryption service does not support the use of IPsec protocols to encrypt network traffic between a computer running the isolation and encryption service and a domain controller when the IP Security Policies are applied through a Group Policy Object. This limitation is not unique to the isolation and encryption service. It is a built-in limitation that prevents the encryption of network traffic from a Windows domain computer to a domain controller that has IP Security Policies applied. For more information about this limitation, see the Microsoft Support article IPsec support for client-to-domain-controller traffic.

Installing the isolation and encryption service on UNIX

This section provides step-by-step instructions for installing the isolation and encryption service on UNIX computers.

Using existing IP Security Policies

Before you install the isolation and encryption service, you should have a Windows environment in which you have configured IP Security Policies for Windows computers and verified that the policies are working as expected. If you have previously configured Active Directory group policies and IP security methods and filters on Windows computers, you can expect a successful deployment of the isolation and encryption service with little or no additional configuration.

If you do not have IP Security Policies configured for Windows computers, you should contact the Active Directory administrator to prepare the environment with the appropriate group policy settings, group policy objects (GPOs), and links, before installing the isolation and encryption service.

Preparing Windows components before installing the isolation and encryption service

The isolation and encryption service does not require you to install any additional components on Windows systems. However, the isolation and encryption service does require you use the Group Policy Management Editor to configure IP Security Policies, and optionally, a Certificate Authority (CA) server to issue certificates for authentication.

To prepare for deploying IP Security Policies for non-Windows computers, you should check that your environment meets the following basic requirements.

For this component	The isolation and encryption service requires
Domain controllers	One of the following platforms: ▪ Windows Server 2008 ▪ Windows Server 2012 or 2012 R2
Certificate Services	A Windows computer with a Certificate Authority (CA) server role and Certificate Services: ▪ Windows Server 2008 ▪ Windows Server 2012 or 2012 R2 Certificate Services are required if you want to use encrypted certificates for authentication, which is the recommended configuration.

Preparing Centrify-managed computers

Before you install the DirectSecure Agent for *NIX on a computer, make sure that the computer meets the following requirements:

- The computer has an operating system version that is supported for use with the Centrify Isolation and Encryption Service.

  For detailed information about the operating systems and versions supported for the version of isolation and encryption service you are installing, see the Centrify web site.

- You can log on to the console.
- You can log on as root.
- There are no other IPsec implementations running on the computer.
- The DirectControl agent for *NIX is installed and matches the version of the isolation and encryption service that you are installing.

  For example, if you are installing DirectSecure agent for *NIX version 5.2.0, you should be sure that the DirectControl agent for *NIX you have installed is version 5.2.0.

You can use `adinfo -v` to verify the version of the DirectControl agent for *NIX that you have installed.

Installing the isolation and encryption service

The isolation and encryption service files are delivered in platform-specific software packages. You can install the software using the native package installer for each platform or using another package management program, such as SMIT or YAST. You must install the DirectSecure agent for *NIX package on each computer that will be configured for IP security.

To install the isolation and encryption service on a computer:

1. Log on as or switch to the `root` user.
2. If you are installing from a CD and the CD drive is not mounted automatically, use the appropriate command for the local computer's operating environment to mount the `cdrom` device.
3. Download or locate the software package for the specific operating system of the computer for which you want to define IP security policies.

   For example, if the operating environment is Red Hat Enterprise Linux, the isolation and encryption service package might be `centrify-ds-release-rhel4.6-i386.tgz`.
4. Unzip and extract the software package using the appropriate commands for the local operating system.

   For example, you might run the following commands if the operating system is Red Hat Enterprise Linux:

   ```
   gunzip -d <centrify-directsecure-package>.tgz
   tar -xf <centrify-directsecure-package>.tar
   ```
5. Install the DirectSecure agent for *NIX package.

   For example, you can use Red Hat Package Manager (`rpm`) to install on Red Hat Enterprise Linux and SuSE Linux:

   ```
   rpm –Uvh <centrify-directsecure-package>.rpm
   ```

   On Solaris computers, run these commands:

```
gzip -d <centrify-directsecure-package>.tgz
tar -xvf <centrify-directsecure-package>.tar
pkgadd -d CentrifyDS
```

On Debian computers, run this command:

```
dpkg -i <centrify-directsecure-package>.deb
```

6. Verify that the DirectSecure agent for *NIX is installed.

   - On SUSE Linux and RHEL computers:

     ```
     rpm -qa CentrifyDS
     ```

     As a result, you should see something like this:

     ```
     CentrifyDS-<release>
     ```

   - On Solaris computers:

     As a result, `pkginfo` should show status of `completely installed`.

     ```
     pkginfo -l CentrifyDS
     ```

   - On Debian computers:

     ```
     dpkg -l | grep centrifyds
     ```

     As a result, you should see something like this:

     ```
     centrifyds-<release>
     ```

Installing the DirectSecure agent for *NIX on Solaris computers with zones

For zones that have their own physical network interface cards, you can install the DirectSecure agent for *NIX in them according to the install instructions mentioned in the previous section. Each zone is effectively treated as a separate, virtual computer.

For zones that have virtual network interface cards, such as where the Global Zone provides the network interface, don’t install the DirectSecure agent for *NIX in the zone. Instead, install the DirectSecure agent for *NIX in the Global Zone (use the `pkgadd` command with the `-G` option). An installation in the Global Zone provides isolation and encryption service services for all zones for which the Global Zone provides a network interface.

Uninstalling the DirectSecure agent for *NIX

If you need to uninstall the DirectSecure agent for *NIX, run one of the commands below.

- On SUSE or RHEL computers:

  ```
  rpm -e CentrifyDS
  ```

- On Solaris computers:

  ```
  pkgrm CentrifyDS
  ```

- On Debian computers:

  ```
  dpkg -P centrifyds
  ```

Checking whether IP security policies are deployed

If you have previously configured a Group Policy Object with IP security methods and filters and applied the GPO to the Active Directory site or a domain the non-Windows computer is part of, those policies can be inherited without further configuration. After you have installed the the DirectSecure agent for *NIX package, you can use the `adsec` command to check whether the isolation and encryption service is installed and currently running.

For example, to see if there are IP security policies applied on the local computer, run the following command:

```
adsec --status
```

```
IKE service ... running
```

If the IKE service is running, you can establish secure communications between the local computer and the following types of Windows computers:

- Windows 7 or later
- Windows 8 or 8.1
- Windows 2008 or 2008 R2
- Windows Server 2012 or 2012 R2

You cannot encrypt network traffic between a computer running the isolation and encryption service and a domain controller when security policies are applied through a Group Policy Object on a domain controller. For information about this limitation, see the Microsoft Support article, IPsec support for client-to-domain-controller traffic.

Viewing details about the policies deployed

If the `adsec --status` command indicates that the IKE service is currently running, there are IP security policies assigned to the local computer. To see details about the policies that have been assigned, run the following command:

```
adsec --policy
--------------------------------------------------------
Machine IP addresses used for "My Address" in IPsec rules:
     192.168.43.133
--------------------------------------------------------
Policy: Client (Respond Only)
 IKE settings
   PFS: 0
   Options: 0
   QMLimit: 11
   Phase 1 SA settings
     3des  / sha1  / dh-2 life(secs):28800
     3des  / md5   / dh-2 life(secs):28800
     des   / sha1  / dh-1 life(secs):28800
--------------------------------------------------------
 Rule 0() active
Warning: MS default rules are not supported. skipping rule
--------------------------------------------------------
```

If the `adsec --status` does not return a running status, there are no IP security policies currently assigned to the local computer. For information about configuring IP security policies for the computer, see Configuring the isolation and encryption service .

Configuring the isolation and encryption service

This chapter explains how to configure IP Security Policies as implemented by the isolation and encryption service.

How to configure IP Security Policies

After you have installed the isolation and encryption service on Centrify-managed computers that are joined to an Active Directory domain, you configure IP Security Policies for those computers exactly as you do for Windows computers in the domain. You configure the rules and filters by setting IP Security Policies in a Group Policy Object. You can then apply the Group Policy Object to a site, domain, or organizational unit that includes the Centrify-managed computers.

For more information about configuring group policies, editing Group Policy Objects, and applying Group Policy Objects, see the Group Policy Guide.

To configure IP Security Policies for Centrify-managed computers:

1. Verify that port 135 is open on your Active Directory domain controllers to allow TCP communication.
2. Install the DirectSecure agent for *NIX on computers in the domain as described in Installing the isolation and encryption service.
3. Open the Group Policy Management console and expand the domains or organizational units to locate the Group Policy Objects you have

deployed and where they are applied.

For example, select the Default Domain Policy or the Default Domain Controllers Policy, then click the **Scope** and **Settings** tabs to see details about the settings you have defined for those Group Policy Objects.

4. Select an existing Group Policy Objects or right-click a domain or container to create a new Group Policy Object.
5. Right-click the Group Policy Object, then click **Edit**.
6. In the Group Policy Management Editor, expand **Computer Configuration** > **Policies > Windows Settings** > **Security Settings** > **IP Security Policies on Active Directory**.
7. Select **Secure Server (Require Security)**, right-click, then click **Properties** to review specific IP Security Policies you have defined for Windows computers.

   If your Centrify-managed computers are on the same subnets as your Windows computers and you want to apply the same IP Security Policies to them, no additional configuration is necessary. The IP Security Policies rules you have defined for Windows will apply automatically to the Centrify-managed computers.

   If the Centrify-managed computers are on different subnets than the Windows computers, you must define new IP Security Policies for them.
8. Right-click **IP Security Policies for Active Directory**, then click **Create IP Security Policy** to create a new IP security policy for Centrify-managed computers.
9. Follow the prompts displayed in the wizard to create the new IP Security Policies to enforce.
10. On the UNIX computer where you installed the isolation and encryption service, run the `adsec --policy` command to verify the IP Security Policies configuration.

    If you see error or warning messages in the output from `adsec`, see Addressing warnings returned when you run adsec for more information about the problems found.

Understanding unsupported IP Security features

After you define IP Security Policies, those IP Security Policies can apply to both Windows and Centrify-managed computers. In most cases, the isolation and encryption service enforces the IP Security Policies exactly as they are defined for Windows computers. However, there are a few IP Security Policies that differ slightly when they are applied to Windows from when they are applied on Centrify-managed computers. There are also a few specific IP Security Policies that are not supported for Centrify-managed computers.

You can use the `adsec --policy` command to see details about the active IP Security Policies, including any Windows configuration settings that cannot be implemented on Centrify-managed computers. You should run this command to verify your IP Security Policies configuration, especially if you want to apply the same IP Security Policies to both Windows and Centrify-managed computers.

Troubleshooting the isolation and encryption service and IP Security Policies

This chapter explains how to troubleshoot the IP Security Policies as implemented by the isolation and encryption service.

Common application failures

Certain command-line programs—such as `ftp` and `ping`—may fail the first time you use them after installing the DirectSecure agent for *NIX. In most cases, this failure is temporary and the applications will run successfully after a short delay.

The reason some applications fail initially is because they were originally written before IP security was developed. The first time you execute a command such as `ping`, there are no security associations (SA's) for the communication, so the kernel requests an SA from the IKE daemon and issues `EAGAIN` to the `ping` command so it will try again. However, on some platforms, the command simply fails, rather than executes again. In this case, if you issue the command again, the SA has probably been created and the command should succeed.

Using adsec to view IP Security Policies

You can use the `adsec` command line program to display information about the currently defined IP Security Policies and any policies that cannot be implemented due to platform restrictions. You can also use the adsec command to manage IP security settings on a Centrify-managed computer.

The basic syntax for adsec is:

```
adsec [--certs] [--debug [on | off]] [--disable] [--enable] [--
flush [sa | sp | all]] [--ikeinfo] [--info] [--policy] [--reload]
[--reset] [--sainfo] [--spinfo] [--status] [--stop] [--support]
[--unconfig] [--version]
```

Setting valid options

You can use the following options with this command:

Use this option	To do this
`--certs`	Display information about the certificates stored in the `/var/centrify/net/certs` directory. This option also performs a basic test to verify that the public key information stored in each certificate matches the private key data stored in the associated key file.
`--debug on | off`	Turn debugging on or off. The default, if you do not specify this parameter, is off. Debugging information is sent to the `/var/log/centrify-racoon.log` file. Turning on debugging with this parameter, sets `racoon` debugging to verbose and updates the `/etc/sysconfig/centrify-racoon` configuration file with changes to RACOON_OPTS.
`--disable`	Suspend processing of IP Security Policies to allow you to make manual changes to the policy. Note that manual changes are overwritten when group policy processing is re-enabled.
`--enable`	Enable the processing of IP security policies. By default, policy processing is enabled. Use this option to re-enable IP security policies after suspending them with the `--disable` option.
`--flush sa | sp | all`	Flush the Security Authority (`sa`) database, the Security Policy (`sp`) database, or both (`all`). These databases hold the security authority and security policy information. If these policies are not working as expected, for example, if they are restricting traffic with the domain controller, flushing the policies allows easy recovery.
`--ikeinfo`	Display the state of IKE negotiation with its peers.
`--info`	Display the state of group policy management and whether group policy management of IP Security Policies is enabled or disabled on the computer.
`--policy`	Print a readable version of the IP security policies to standard output,

Use this option	To do this
	including any errors or warnings that were generated. See Examples of using adsec for a list of IP security policies errors reported by the `--policy` option.
`--reload`	Flush the Security Authority and Security Policy databases, then reload the information from the `racoon spd.conf` file.
`--reset`	Restart the `IKE` daemon.
`--sainfo`	List information about the active security associations.
`--spinfo`	List security policy information, including source and destination addresses, direction, protocols to control, and the rules to apply.
`--status`	Show the status of the `IKE` daemon.
`--stop`	Stop the `IKE` daemon.
`--support`	Generate a compressed archive file containing information that can be used by customer support to troubleshoot the IP security policies, including: - The IKE configuration file - The current Security Policy Database (SPD) configuration - The `IKE` log file, which is located in `/var/log`. The name of the log file will vary depending on the IKE daemon, which may be provided by the operating system or installed by the isolation and encryption service. The compressed archive file is created as `/var/centrify/tmp/centrify_ipsec_tar.gz`.
`--unconfig`	Remove the configuration settings. This setting is primarily used by the package scripts so that the package can be uninstalled. If you run `adsec --unconfig` by mistake, you can run the `adgpupdate` command to reconfigure the isolation and encryption service again.
`--version`	Display version information for `adsec`.

Examples of using adsec

In most cases, you use `adsec` to provide information that you can use to diagnose and resolve problems with the configuration of IP Security Policies.

The `--policy` option prints to standard output details of the IP Security Policies on Active Directory configuration. Included in the output are warnings and error messages for any settings that cannot be implemented or are ignored by the isolation and encryption service.

Note The `adsec --policy` command retrieves information about the IP Security Policies directly from Active Directory, not from the configuration files on the managed computer. If you run `adsec --policy` immediately after making changes to group policies in Active Directory, the command output will show any changes that were made, but the changes will not be written to the configuration files on the managed computer until the next refresh interval (default is 8 hours). You can force a refresh of the IP Security Policies on a computer by running the `adgpupdate` command.

The following example shows the configuration for one of the Windows default policies, **Secure Server (Require Security)**:

```
adsec --policy
-----------------------------------------------------------------
Machine IP addresses used for "My Address" in IP Security Policy
rules:
     192.168.43.133
-----------------------------------------------------------------
Policy: Secure Server (Require Security)
 IKE settings
   PFS: 0
   Options: 0
   QMLimit: 0
   Phase 1 SA settings
     3des  / sha1  / dh-2 life(secs):28800
     3des  / md5   / dh-2 life(secs):28800
     des   / sha1  / dh-1 life(secs):28800
Warning: Diffie-Hellman group: dh-1 is different from the first
security method offer, dh-2 will be used instead
     des   / md5   / dh-1 life(secs):28800
Warning: Diffie-Hellman group: dh-1 is different from the first
security method offer, dh-2 will be used instead
-----------------------------------------------------------------
 Rule 0(All ICMP Traffic) active
   Authorization Modes:
     krb5 /
   Policy:
     Action: ipsec esp/transport//unique
Warning: Changing policy action from inbound pass through to
```

```
secure
     SA offers:
         Lifetime(secs): 900
         Lifetime(KB): 100000
         Use PFS): no
         3des  / sha1  / esp
         3des  / md5   / esp
         des   / sha1  / esp
         des   / md5   / esp
   Filters:
        My Address           -> Any Address          mirror:y
protocol:icmp
-----------------------------------------------------------------
 Rule 1() active
Warning: MS default rules are not supported. skipping rule
-----------------------------------------------------------------
 Rule 2(All IP Traffic) active
   Authorization Modes:
     krb5 /
   Policy:
     Action: ipsec esp/transport//unique
Warning: Changing policy action from inbound pass through to
secure
     SA offers:
         Lifetime(secs): 900
         Lifetime(KB): 100000
         Use PFS): no
         3des  / sha1  / esp
         3des  / md5   / esp
         des   / sha1  / esp
         des   / md5   / esp
   Filters:
        My Address           -> DNS Server           mirror:y
protocol:any
Warning: Destination address set to DNS server is not supported.
skipping filter
-----------------------------------------------------------------
```

Addressing warnings returned when you run adsec

This section lists the warnings and errors related to the specific IP Security Policies that are not supported or not fully supported by the isolation and encryption service. If you run the `adsec --policy` command on a managed computer and see any errors or warnings, this section describes where you can find the related feature in IP Security Policies group policy configuration, how to correct the error, and the consequences of leaving the setting unchanged.

- Warning: MS default rules are not supported
- Warning: Diffie-Hellman group

- Warning: Destination address is not supported
- Warning: Lifetime (secs)
- Warning: Mixing ESP and AH is not supported
- Warning: Changing policy action from inbound pass through to secure

Warning: MS default rules are not supported

When you configure IP Security Policies, you can activate a default response rule. The default response rule responds to remote computers that request secure communication when no other rule applies. The isolation and encryption service ignores this setting. However, if you create an IP Security Policies with rules for all situations, ignoring the default response rule does not leave any holes in your IP security.

Symptom

If you have configured IP Security Policies with the **Activate default response rule** option selected and that policy is applied to Centrify-managed computers, the `adsec --policy` command displays the following message:

```
Warning: MS default rules are not supported. Skipping rule
```

Solution

Leaving the **Activate default response rule** option selected has no affect on your IP Security Policies for Centrify-managed computers other than you see a warning whenever you run `adsec --policy`. However, you should be aware that the computer does not have an active default response rule to fall back to if no other rules apply.

If you want to change the setting that generates the warning message, do the following:

1. Select the group policy object to edit and navigate to the IP Security Policies. For example, select **Computer Configuration > Policies > Windows Settings > Security Settings > IP Security Policies** in the Group Policy Management Editor.

2. Select the IP security policy to edit, right-click, then click **Properties**.

   If you have not previously created IP Security Policies or do not want to edit an existing one, right-click, then click **Create IP Security Policy** and follow the prompts displayed to specify the name and description of the policy. When prompted for **Requests for Secure Communication** do not select **Activate the default response rule**.

3. On the Rules tab, uncheck the **Default response** IP filter option, then click **OK**.

Warning: Diffie-Hellman group

When you configure IP Security Policies, you configure the security methods used to protect identities during key exchange. Typically, you configure multiple methods that have different encryption strengths so that you can accommodate connections with a range of computers that have different requirements.

When you are configuring the properties for the Key Exchange Security Methods, you list the methods in the order to use when negotiating the key exchange with another computer. For each method, you must also specify the level — low (1), medium (2), or high (3) — for the Diffie-Hellman groups. Diffie-Hellman groups form the basis for creating future keys.

If you specify different Diffie-Hellman levels for the encryption methods allowed, Windows-to-UNIX or UNIX-to-Windows connections may fail. However, Windows-to-Windows connections and UNIX-to-UNIX connections should work as expected.

Symptom

If you have configured IP Security Policies with different Diffie-Hellman levels assigned to different security methods and that policy is applied to Centrify-managed computers, the `adsec --policy` command displays a message similar to the following:

```
Warning: Diffie-Hellman group: dh-1 is different from the first
security method offer, dh-2 will be used instead
```

Solution

If you want to change the setting that generates the warning message, do the following:

1. Select the group policy object to edit and navigate to the IP Security Policies. For example, select **Computer Configuration > Policies > Windows Settings > Security Settings > IP Security Policies** in the Group Policy Management Editor.
2. Select the IP security policy to edit, right-click, then click **Properties**.
3. Click the **General** tab, then click **Settings**.
4. In the Key Exchange Setting dialog box, click **Methods**.
5. Configure all of the methods listed in the Key Exchange Security Methods to use the same Diffe-Hellman level, then click **OK**. Using the same level for all methods ensures that no connection errors occur during the Internet Key Exchange (IKE) process.

Warning: Destination address is not supported

When creating a filter list for the source or destination address, you can select a server type—for example DNS, WINS, DHCP, or Default Gateway—instead of a specific or general IP address. The isolation and encryption service ignores these settings.

Symptom

If you have configured an IP security policy with DNS,WINS, DHCP, or Default Gateways filters and that policy is applied to Centrify-managed computers, the `adsec --policy` command displays a message similar to the following:

```
Warning: Destination address set to serverType server is not
supported. skipping filter
```

where `serverType` is one of: `DNS`, `WIND`, `DHCP`, `Default Gateway`

Solution

If you want to change the setting that generates the warning message, do the following:

1. Select the group policy object to edit and navigate to the IP Security Policies. For example, select **Computer Configuration > Policies > Windows Settings > Security Settings > IP Security Policies** in the Group Policy Management Editor.
2. Select the IP security policy to edit, right-click, then click **Properties**.
3. On the **Rules** tab, uncheck the **Use Add Wizard** option, then click **Add**.
4. On the IP Filter List tab, select an IP Filter, then click **Edit**.
5. Click Edit to display the IP Filter Properties.
6. Change the Source or Destination address that specifies a server type, such as DNS Servers, to **A specific IP Address or Subnet**, then type the IP address for a specific server type, such as the DNS server.

Warning: Lifetime (secs)

When you configure IP Security Policies, you can define multiple security methods in an ordered list to accommodate connection to computers with different security capabilities. For each method, you can specify the lifetime of the key in kilobytes, in seconds, or in both.

The isolation and encryption service does not support the kilobytes setting—it is ignored. For the isolation and encryption service, the key lifetime must be specified in seconds.

If the number of seconds for the key lifetime differs for any of the security methods for any given filter action, Windows-to-UNIX connections or UNIX-to-Windows connections may fail. However, Windows-to-Windows and UNIX-to-UNIX connections should work as expected.

Symptom

If you have configured IP Security Policies with different lifetime values assigned to different security methods or specified the lifetime in KB instead of seconds and that policy is applied to Centrify-managed computers, the `adsec --policy` command displays a message similar to the following:

```
Warning: Lifetime(secs):600 is different from the first SA offer,
900 will be used instead
```

Solution

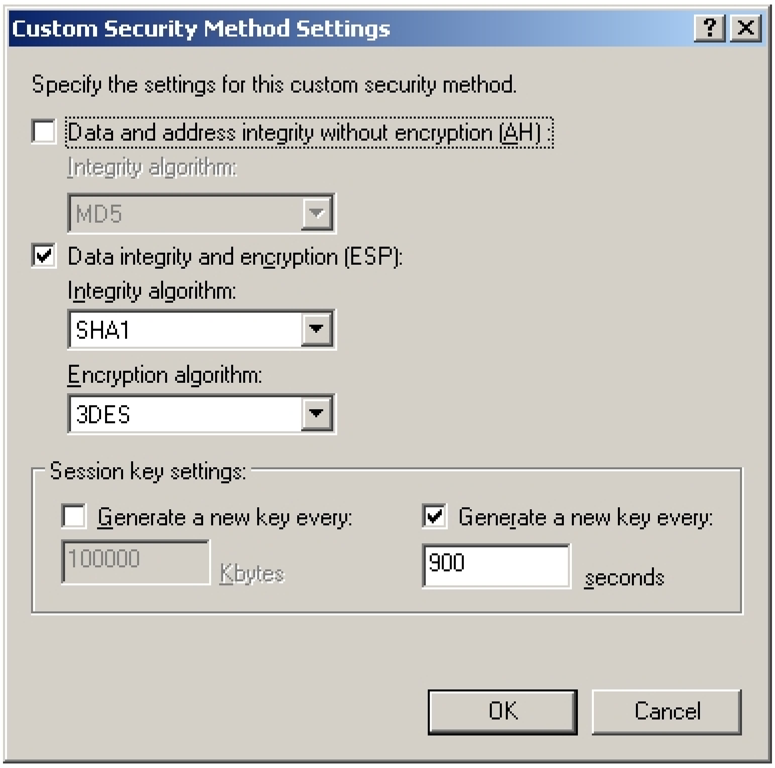
If you want to change the setting that generates the warning message, do the following:

1. Select the group policy object to edit and navigate to the IP Security Policies. For example, select **Computer Configuration > Policies > Windows Settings > Security Settings > IP Security Policies** in the Group Policy Management Editor.
2. Select the IP security policy to edit, right-click, then click **Properties**.
3. On the **Rules** tab, uncheck the **Use Add Wizard** option, then click **Add**.
4. Click the **Filter Action** tab.
5. Select a filter action, such as **Require Security**, then click **Edit**.
6. Check the Key Lifetime for each security method and configure the value in seconds to be the same for all methods.

   To change the lifetime for a new key:

   - Select a method in the list, then click **Edit**.
   - Select **Custom**, then click **Settings**.
   - Set a new value for the number of seconds, then click **OK**. The

Kbytes setting is ignored whether you check it or not.



Custom Security Method Settings

Specify the settings for this custom security method.

□ Data and address integrity without encryption (AH):

Integrity algorithm: MD5

☑ Data integrity and encryption (ESP):

Integrity algorithm: SHA1

Encryption algorithm: 3DES

Session key settings:

□ Generate a new key every: 100000 Kbytes

☑ Generate a new key every: 900 seconds

Warning: Mixing ESP and AH is not supported

When you configure IP Security Policies, you can define multiple security methods in an ordered list to accommodate connections to computers with different security capabilities. For each security method, you can select **Data and address integrity without encryption (AH)** or **Data integrity and encryption (ESP)**. However, for any given filter action, if you mix AH and ESP for the security methods, Windows-to-UNIX connections or UNIX-to-Windows connections may fail. However, Windows-to-Windows and UNIX-to-UNIX connections should work as expected.

Symptom

If you have configured IP Security Policies with security methods that have a mix of data integrity with and without encryption and that policy is applied to UNIX computers, the `adsec --policy` command displays a message similar to the following:

```
Warning: Mixing ESP and AH in the same SA is not supported, ESP
will be used instead
```

Solution

If you want to change the setting that generates the warning message, do the following:

1. Select the group policy object to edit and navigate to the IP Security Policies. For example, select **Computer Configuration > Policies > Windows Settings > Security Settings > IP Security Policies** in the Group Policy Management Editor.
2. Select the IP security policy to edit, right-click, then click **Properties**.
3. On the **Rules** tab, uncheck the **Use Add Wizard** option, then click **Add**.
4. Click the **Filter Action** tab, select an IP Filter, then click **Edit**.
5. Select a filter action, such as **Require Security**, then click **Edit**.
6. Configure AH or ESP for all methods in the list to avoid potential connection problems between UNIX and Windows computers.

   To change the data integrity and encryptions settings:

   - Select a method in the list, then click **Edit**.
   - Select **Custom**, then click **Settings**.
   - Select the appropriate data integrity and encryption options to make all security methods consistent, then click **OK**.

Warning: Changing policy action from inbound pass through to secure

When you configure IP Security Policies, the following two settings work together to determine the fallback IP security policy:

- **Accept unsecured communication, but always respond using IP Security Policy** specifies whether inbound traffic must be secure.
- **Allow fallback to unsecured communication if a secure connection can not be established** specifies whether outbound traffic must be secure.

The isolation and encryption service supports any combination of these settings, except turning off the first (leaving it unchecked) and turning on the second.

```
[ ] Accept unsecured communication, but always respond using
IPsec
```

```
[X ] Allow fallback to unsecured communication if a secure
connection can not be established
```

For the isolation and encryption service, turning off the first setting and turning on the second setting, is the same as turning both off.

Symptom

If you have configured IP Security Policies with the unsupported inbound and outbound settings, the `adsec --policy` command displays a message similar to the following:

```
Warning: Changing policy action from inbound pass through to
secure
```

Solution

If you want to change the setting that generates the warning message, do the following:

1. Select the group policy object to edit and navigate to the IP Security Policies. For example, select **Computer Configuration > Policies > Windows Settings > Security Settings > IP Security Policies** in the Group Policy Management Editor.
2. Select the IP security policy to edit, right-click, then click **Properties**.
3. On the **Rules** tab, uncheck the **Use Add Wizard** option, then click **Add**.
4. Click the **Filter Action** tab.
5. Select a filter action, such as **Require Security**, then click **Edit**.
6. Check the selections for unsecured communication.
    - If **Accept unsecured communication, but always respond using IP Security Policy** is not selected, you should verify that **Allow fallback to unsecured communication if a secure connection can not be established** is also not selected.
    - If **Allow fallback to unsecured communication if a secure connection can not be established** is selected, you should verify that **Accept unsecured communication, but always respond using IP Security Policy** is also selected.

For the isolation and encryption service, if secure inbound traffic is required, secure outbound traffic is also required.

Centrify Isolation and Encryption Service Known issues

There are some known issues when deploying and using the isolation and encryption service. Some of these issues have workarounds.

Fails to connect due to time out

Symptom

When trying to connect from a Solaris machine to another UNIX machine after applying IPsec group policy (for example, using ssh), the connection may fail with a time-out.

Explanation

The reason why this happens is that Solaris does not work properly with 'non-mirror' or 'any protocol' settings in the IPsec policy (Ref: DS-521, DS-438).

Computers on which IPsec policy allows only ICMP traffic are not always able to ping

Symptom

If the effective IPsec policy allows ICMP traffic only (no UDP or TCP traffic allowed), Windows computers can ping UNIX computers, but UNIX computers cannot ping Windows computers.

The problem is caused by the Linux implementation of ping; it does a UDP bind to the remote machine and this causes IPsec to establish SAs, even though they are not needed.

Solution

In these situations, ping a Windows computer from a UNIX computer by running the following command

```
ping -I <my ip address><remote ip address>
```

Certificate principal mapping is not supported

Certificate principal mapping ensures that the computer is known to Active Directory before accepting certificates. This feature is not supported.

Certificate-based IPsec to the CA is not supported

Usually, customers allow unrestricted access to a certificate authority (CA) system. Although it is possible to configure certificate-based IPsec authentication to the CA (for example, you can do this by specifying a subnet-wide policy without exclusions), this configuration is not supported in environments with only Microsoft Windows computers (no UNIX/Linux computers).

Restarting centrify-racbridge and centrify-racoon services on Solaris (Ref: DS-449)

Symptom

"The `svcadm restart centrify-racbridge` command does not start the centrify-racbridge and centrify-racoon services in proper order.

Solution

Use the `adsec -r` command instead.

CertGP takes a long time and can get aborted on Solaris (Ref: IN-90001)

Symptom

the isolation and encryption service implements PKI certificate handling as a group policy, and the DirectControl Group Policy Mapper runs the PKI certificate handling.

On Solaris computers, the CertGP group policy takes longer to run than on other platforms and can run longer than the default timeout value associated with DirectControl group policies; as a result, the CertGP is aborted.

Solution

Increase the DirectControl group policy timeout value and restart DirectControl agent for *NIX.

To increase the default timeout value for DirectControl group policies on Solaris computers:

1. Open this file: `/etc/centrifydc/centrifydc.conf`.
2. Locate this property:

   ```
   # gp.mappers.timeout: 30
   ```
3. Uncomment the line (remove the "# " at the beginning) and change the value to 60.
4. Save the file.
5. Restart DirectControl agent for *NIX by running the following command:

   ```
   /usr/share/centrifydc/bin/centrifydc restart
   ```

Submitting isolation and encryption service issue details to Centrify Technical Support

If a problem occurs, please send a problem description to support@centrify.com. To improve the speed of resolution, please include information about the system and version of software you are using. One way of doing it is to run the following commands and paste the output into the report.

For SUSE or RHEL computers:

```
hostname ; uname -a; nslookup `hostname`; rpm -qa | grep
Centrify*; adsec –support
```

For Solaris computers:

```
hostname ; uname -a; nslookup `hostname`; pkginfo -l CentrifyDS;
adsec –support
```

For Debian computers:

```
hostname ; uname -a; nslookup `hostname`; dpkg -l | grep
centrify*; adsec –support
```

Configuring a Linux server for DirectAccess

This chapter provides step-by-step instructions for how to control access to a Linux server with Centrify Isolation and Encryption Service using DirectAccess and the DirectAccess Test Lab environment.

Introduction to DirectAccess

DirectAccess is a technology introduced in the Windows 7 and Windows Server 2008 R2 operating systems that enables remote users to access Windows servers on corporate intranets without connecting to a virtual private network (VPN).

Centrify Isolation and Encryption Service extends DirectAccess to enable secure access to Linux servers within a corporate intranet.

Microsoft provides extensive documentation and samples for DirectAccess, including the DirectAccess Test Lab Guide, which shows how to set up a simulated DirectAccess environment with Windows servers and client computers.

Centrify Isolation and Encryption Service integrates seamlessly with DirectAccess. The step-by-step instructions in this chapter demonstrate how to add a Linux server running the isolation and encryption service to a DirectAccess-configured intranet and access the server’s resources from a remote client computer through a DirectAccess connection.

Note The instructions in this chapter are only for the purpose of demonstrating isolation and encryption service functionality. The sample configuration does not reflect best practices nor does it serve as the basis for a DirectAccess production environment.

Sample configuration overview

You need the following computers to set up the sample DirectAccess environment:

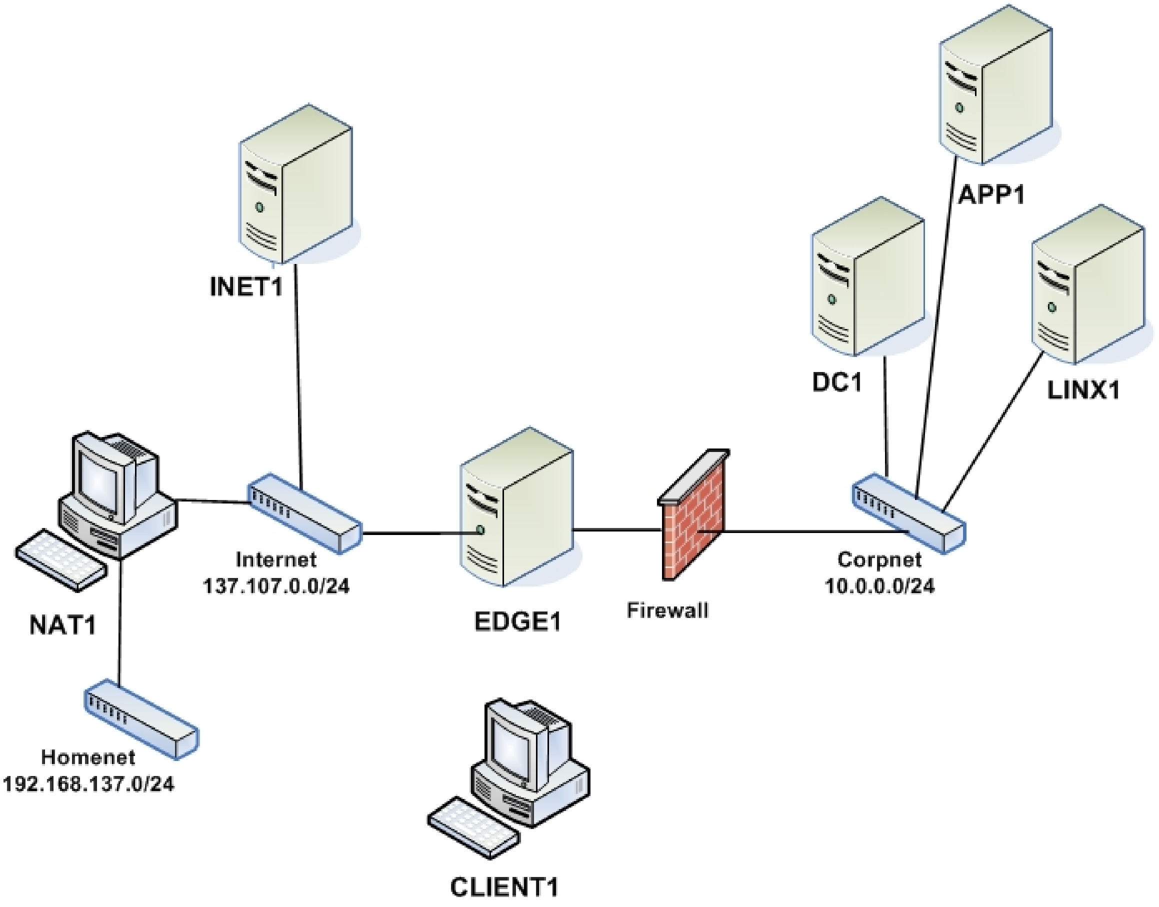
- A Linux server named LINX1 that is running kernel 2.6.25 or later, and is configured as a general application server.
- A Windows Server 2008 R2 Enterprise Edition computer named DC1 that is configured as an intranet domain controller, Domain Name System (DNS) server, Dynamic Host Configuration Protocol (DHCP) server, and an enterprise root certification authority (CA).
- A Windows Server 2008 R2 Enterprise Edition intranet member server named APP1 that is configured as a general application server and network location server.
- A Windows Server 2008 R2 Enterprise Edition intranet member server named EDGE1 that is configured as the DirectAccess server.
- A Windows Server 2008 R2 Enterprise Edition standalone server named INET1 that is configured as an Internet DNS server, DHCP server, and web server.
- A Windows 7 Ultimate Edition client computer named NAT1 that is configured to use a network address translator (NAT) device using Internet Connection Sharing.
- A Windows 7 Ultimate Edition roaming member client computer named CLIENT1 that is configured as a DirectAccess client.

Note If you have already set up the DirectAccess Test Lab, LINX1 is the only computer that is new for setting up an environment that includes the isolation and encryption service. All of the Windows computers are part of the standard Test Lab configuration for DirectAccess.

The DirectAccess test lab consists of three subnets that simulate the following:

- The Internet (131.107.0.0/24).
- A home network named Homenet (192.168.137.0/24) connected to the Internet by a NAT.
- An intranet named Corpnet (10.0.0.0/24) separated from the Internet by the DirectAccess server.

Computers on each subnet connect using a hub, switch, or virtual switch. See the following figure.



DirectAccess Resources

Microsoft provides extensive DirectAccess documentation, including the following:

- DirectAccess Solutions home page—Provides links to specific DirectAccess resources and documentation.
- Microsoft Test Lab Guide for DirectAccess—Provides step-by-step instructions for setting up the simulated DirectAccess environment that is the basis for the sample configuration in this chapter.
- Troubleshoot DirectAccess—A companion to the Test Lab Guide that provides tools and information for troubleshooting issues with DirectAccess.
- Step 3: Configure the DC1 domain controller

DC1 is already configured as a domain controller, as the DNS and DHCP server for the Corpnet subnet, and as the enterprise root CA for the domain; it is also configured for DirectAccess.

Step 1: Set up the DirectAccess test lab

Note The starting point for the configuration in this chapter is the DirectAccess test lab.

The starting point for testing how to access a Linux server with Centrify Isolation and Encryption Service through Microsoft DirectAccess is the DirectAccess Test Lab. To set up the DirectAccess test lab, complete *all* the procedures *exactly* as described in the Microsoft Test Lab Guide for DirectAccess.

When finished, you should have a working lab configuration with:

- Four servers and two client computers.
- A network with simulated home network, the Internet, and a corporate intranet

The test lab configuration with the added Linux server is illustrated in Sample configuration overview.

Step 2: Configure the LINX1 Linux server

To configure the Linux server, you must install the DirectControl agent for *NIX, join the domain, and install Centrify Isolation and Encryption Service.

To install the DirectControl agent for *NIX on the LINX1 Linux computer:

1. Run the `install.sh` command to install the platform-specific DirectControl agent for *NIX and optional packages. For example:

   ```
   ./install.sh
   ```

2. Follow the prompts displayed to select the tasks to perform and

components to install.

You can accept the default that the installer provides for many of the prompts by pressing **Enter**.

For the zone, enter **NULL_AUTO**, which joins you to the domain through Auto Zone, a mechanism that authentication service provides to join Active Directory without installing the Access Manager console on DC1 and configuring a zone.

```
Do you want to run adcheck to verify your AD environment?:y
Join an Active Directory domain: Y
Enter the Active Directory domain to join: corp.contoso.com
Enter the Active Directory authorized user [administrator]
Enter the password for the Active Directory user:
Enter the computer name [LINX1]
Enter the container DN [Computers]
Enter the name of the zone [default]: NULL_AUTO
Enter the name of the domain controller [auto detect]
Reboot the computer after installation: Y
```

For more information about installation options, see the *Planning and Deployment Guide*.

3. After verifying that the information in the installation summary is correct, type **Y** and press **Enter** to install the DirectControl agent for *NIX and join the domain.

4. To verify the installation and that the DirectControl agent is running, open a terminal window and type the `adinfo` command, and you should see information similar to the following:

```
[root]# adinfo
...
Local host name:     linx1
Joined to domain:    corp.contoso.com
Joined as:           linx1.corp.contoso.com
Pre-win2kname:       linx1
Current DC:          dc1.corp.contoso.com
Preferred site:      Default-FirstSite-Name
Zone:                Auto Zone
CentrifyDC mode:     connected
Licensed Features:      Enabled
```

When you join the domain, a computer account is created for LINX1 in Active Directory.

To install the Centrify agent for *NIX on the LINX1 computer:

1. Copy the appropriate package for the local computer's operating environment to a local directory.

   For example, if the operating environment is Red Hat Enterprise Linux:

   ```
   cp /mnt/cdrom/Unix/centrify-ds-release-rhel4.6-i386.rpm .
   ```

2. Run the appropriate command for installing the package based on the local computer's operating environment.

   For example, for Red Hat Enterprise Linux, you can use:

   ```
   rpm -ivh centrifyds-release-rhel4.6-i386.rpm
   ```

Step 3: Configure the DC1 domain controller

Configure the DC1 domain controller server as follows.

- Create a DirectAccess server security group
- Apply DirectAccess policies to Linux server
- Assign the group policy

Create a DirectAccess server security group

You need to update the DirectAccess policies to apply to the LINX1 server. To facilitate this process, the isolation and encryption service provides a script (see Apply DirectAccess policies to Linux server) that updates the required policies. The script applies the policies to a security group named DA_Servers, so before running the script, you need to create the group and add LINX1 to it.

To create the DA_Servers group:

1. In the Active Directory Users and Computers console tree, right-click **Users**, then click **New > Group**.
2. In the dialog box, under **Group name**, type **DA_Servers**.
3. Under **Group scope**, choose **Global;** under **Group type**, choose **Security;** then click **OK**.
4. In the details pane, double-click **DA_Servers**.

5. In the **DA_Clients Properties** dialog box, click the **Members** tab, and then click **Add**.
6. In the **Select Users, Contacts, Computers, or Groups** dialog box, click **Object Types**, click **Computers**, and then click **OK**.
7. Under **Enter the object names to select (examples)**, type **LINX1**, and then click **OK**.
8. Verify that **LINX1** is displayed below **Members**, and then click **OK**.

Apply DirectAccess policies to Linux server

The isolation and encryption service provides a PowerShell script to apply DirectAccess policies to the LINX1 Linux server (actually, to the DA_Servers security group, which includes the LINX1 server). For more information, see Create a DirectAccess server security group.

The script is available from the Centrify Download Center.

To run the script:

1. Copy the script, `damod.ps1`, from the Centrify Download Center to a location on DC1.
2. Open a **PowerShell** window, for example:

   Start > All Programs > Accessories > Windows PowerShell
3. Enable scripting by typing the following command:

   ```
   set-executionpolicy remotesigned
   ```
4. The script uses the `get-gpo` cmdlet, which may not be available; to make it available, type the following command:

   ```
   import-module grouppolicy
   ```
5. Change to the directory containing the script, then type:

   ```
   .\damod.ps1
   ```

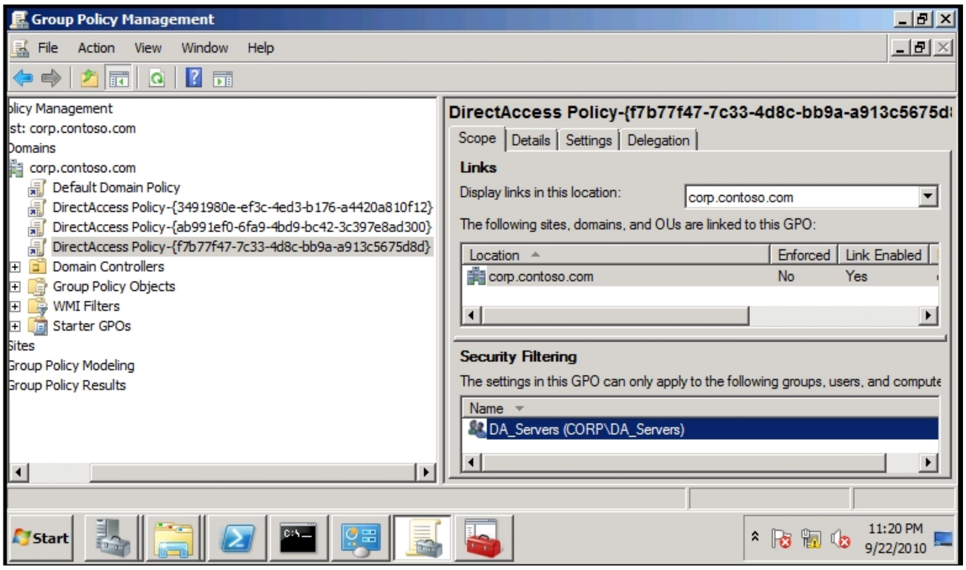
The script creates a DirectAccess policy and applies it to the DA_Servers group.

Assign the group policy

You need to assign the policy to make it active.

To assign the policy:

1. Open the Group Policy Editor.
2. Expand **Domains > corpnet**.
3. You should see three DirectAccess policies under this node:



licy Management
st: corp.contoso.com
Domains
corp.contoso.com
Default Domain Policy
DirectAccess Policy-{3491980e-ef3c-4ed3-b176-a4420a810f12}
DirectAccess Policy-{ab991ef0-6fa9-4bd9-bc42-3c397e8ad300}
DirectAccess Policy-{f7b77f47-7c33-4d8c-bb9a-a913c5675d8d}
Domain Controllers
Group Policy Objects
WMI Filters
Starter GPOs
Sites
Group Policy Modeling
Group Policy Results

DirectAccess Policy-{f7b77f47-7c33-4d8c-bb9a-a913c5675d8

Links

Display links in this location: corp.contoso.com

The following sites, domains, and OUs are linked to this GPO:

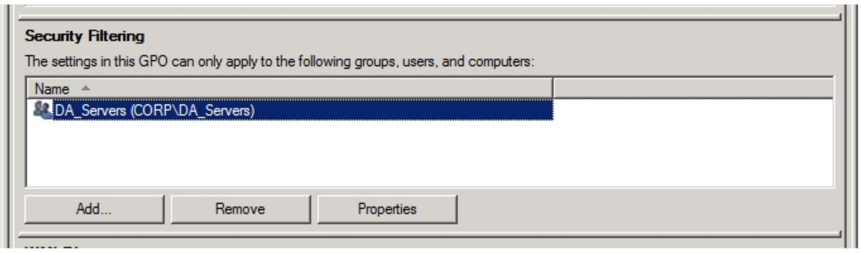
Location	Enforced	Link Enabled
corp.contoso.com	No	Yes

Security Filtering

The settings in this GPO can only apply to the following groups, users, and compute

Name
DA_Servers (CORP\DA_Servers)

4. Scroll to the third one, right-click, and click **Edit**. The policy created by the script applies to the DA_Servers group, so you should see **DA_Servers** listed in **Security Filtering**; if not, open one of the other policies and verify that it is the policy that applies to **DA_Servers**.



Security Filtering

The settings in this GPO can only apply to the following groups, users, and computers:

Name
DA_Servers (CORP\DA_Servers)

5. In the console tree, expand **Computer Configuration > Policies > Windows Settings > Security Settings > IP Security Policies on Active Directory**.
6. In the details pane, select **DA**, then right-click and click **Assign**.

Step 4: Verify IPv6 settings

Verify that IPv6 configuration is enabled for the network interfaces on LINX1.

After you update group policies, the isolation and encryption service will automatically create an ISATAP adapter for LINX1.

Step 5: Update group policies on LINX1 server

Now update group policies to apply the DirectAccess policies to LINX1.

To update group policies:

1. Open a terminal window.
2. Run the following command:

   ```
   adgpupdate
   ```

3. To verify that the DirectAccess policies have been applied to the LINX1 server, run the following isolation and encryption service command, and you should see similar results:

   ```
   [root]# adsec
   ...
   GP Management of IPSec is enabled
   IKE service ... running
   ```

Step 6: Start Apache Web Server

You need to start the Apache Web Server so you can verify DirectAccess connectivity.

To start the Apache Web Server:

1. Open a terminal window.
2. Run the following command:

   ```
   [root]# service httpd start
   ```

Step 7: Update group policy settings for Client1

You need to update group policy settings for the Client1 computer.

To update group policy settings on Client1:

1. Open a **Command Prompt** window.
2. Type:

   ```
   gpupdate
   ```

Step 8: Verify DirectAccess functionality for Client1

After you update group policy settings for the Client1 computer, verify that it can access resources on the LINX1 server that has been added to the DirectAccess configuration.

To verify that Client1 has access to LINX1 resources with intranet connectivity:

1. Unplug the Ethernet cable of CLIENT1 from the switch for the Homenet subnet and plug it into the switch for the Corpnet subnet.
2. Log on to Client1 by using the User1 account.

Open Internet Explorer. In the Address bar of Internet Explorer, type **http://linx1.corp.contoso.com/**, press **ENTER**, and then press **F5**. You should see the default page for the Apache Web Server.

Configuring a Certificate Authority for auto-enrollment

This section describes how to set up a Certificate Authority with the Microsoft Windows certificate auto-enrollment feature to support PKI authentication for the isolation and encryption service.

Working with a single Certificate Authority for UNIX

The isolation and encryption service relies on the Microsoft Windows public key infrastructure (PKI) to obtain the certificates for the UNIX computers that are joined to a domain. The most basic configuration of the Windows PKI environment provides a Windows server as the Certificate Authority (CA) that issues and manages security credentials and public keys through the exchange of encrypted digital certificates. The isolation and encryption service then uses the Microsoft Windows certificate auto-enrollment feature of the Certificate Authority to make certificates available to UNIX computers.

This section describes how to set up a basic environment that has a single, enterprise root Certificate Authority (CA). In this scenario, the Certificate Authority is a Microsoft Enterprise Certificate Server that issues all certificates. In a production environment, you may have more complex requirements that include multiple CAs configured for a domain. However, setting up this sample environment should give you enough information to extend your PKI configuration to a more complex environment.

Note The isolation and encryption service requires a Microsoft Windows Server to be configured as the Certification Authority (CA) for the Active Directory forest. Other Certification Authority certificate issuers are not currently supported.

Preparing a computer to be a Certificate Authority (CA)

The first step in configuring the environment is to identify a computer to be the Certificate Authority server for the Active Directory forest. In most cases, the computer should be an Active Directory domain controller. To become a Certificate Authority, the computer also requires Microsoft Internet Information Services (IIS) and Certificate Services to be installed.

Microsoft Internet Information Services (IIS) are required to handle Certificate Revocation List (CRL) requests made by the isolation and encryption service and to provide the virtual directories required to issue and manage certificates.

Certificate Services are required to enable the computer to act as a Certificate Authority (CA) and issue certificates to other computers that join the domain. The Application server role, which installs IIS, and the Certificate Services server role must be on the same computer. Therefore Centrify recommends that you install IIS at the same time you install Certificate Services.

What's required to install Certificate Services

Before installing Certificate Services, check that you have the following:

- Account credentials for an account that is an Enterprise Administrator or a Domain Administrator of the forest root domain of the Active Directory forest.
- A computer with Windows Server 2008 Enterprise Edition, or later, operating system. Previous versions of Windows Server do not support auto-enrollment within the certificate templates. In addition, the computer must be running Enterprise Edition because Standard Edition does not support the V2 or V3 certificate templates that are required for auto-enrollment.
- Active Directory services must be installed on the Certificate Services server. If you install the Certificate Services server role on a domain controller, no further action is required. When you promote a computer to be a domain controller, the Active Directory services are installed automatically.

Add the required server roles to make the computer a Certificate Authority

After you have verified you have an appropriate account and computer, you can use the Control Panel to add the appropriate server roles.

To install IIS and Certificate Services on a Windows Server:

1. Open the wizard that enables you to manage roles and features.

   For example, on a Windows 2008 computer, open Server Manager and click **Add Roles**. In the Add Roles Wizard window, click **Server Roles**.

2. Select **Active Directory Certificate Services** and **Application Server** (IIS), then click **Add Required Role Services** in the pop-up window.
3. Click **Next** to accept the default values.

   For the type of the computer be certain to choose **Enterprise**, then **Root CA**.

4. Enter a name for the CA, then click **Next** to accept the default values on each screen.
5. Click **Finish** to complete installation.

After you have added the server roles and created the CA, you can view the CA you just created by using the MMC Certification Authority snap-in.

Adding a trusted root certificate to the group policy

To establish a chain of trust for your PKI environment, you identify the CA you just created as a trust anchor.

To establish the CA as a trust anchor, add the root certificate for the CA to the **Trusted Root Certification Authorities** container in the group policy object that defines the IP Security policies.

To add a trusted root certificate to the group policy object:

1. Open the Certificates (MMC) snap-in.

   If the Certificates snap-in is not available, you can run MMC and click **File > Add/Remove Snap-in** to add it.

2. Click **Certificates > Trusted Root Certification Authorities > Certificates**.
3. Select the root certificate generated by the CA you created in the previous procedure, then double-click it to see its Properties page.
4. Click the **Details** tab; then click **Copy to file** to start the Certificate Export Wizard. In the wizard, make the following selections:
   - **File format:** *DER encoded binary X.509 (.CER)*
   - **File Name:** Anywhere on the local server
   - **Include all certificates in the certification path:** *No*
5. Open the Group Policy Object Editor and select the group policy object that defines the IP Security policies.
6. Click **Computer Configuration > Policies > Windows Settings > Security Settings > Public Key Policies > Trusted Root Certification Authorities**.
7. Select **Trusted Root Certification Authorities,** right click, and select **Import** to open the Certificate Import Wizard.
8. Click **Next** on the **Welcome** screen.
9. Browse to find the root certificate you copied in Step 4, then click to accept the default values on each screen.
10. Click **Finish** to complete the wizard.

The root certificate is now in the Active Directory Trusted Root Certification Authorities container. Certificates in this container are downloaded to any computer that joins the domain to establish trust for the root CA.

Enabling auto-enrollment

The isolation and encryption service uses the Microsoft Windows certificate auto-enrollment feature to make certificates available to UNIX computers. If auto-enrollment is enabled, when a UNIX computer joins a domain, the isolation and encryption service requests certificates from the CA based on particular templates, and installs them on the joined computer.

Enabling auto-enrollment for the group policy

To enable auto-enrollment for the group policy:

1. Open the Group Policy Object Editor and select the group policy object that defines IPsec policies.
2. In the left pane, click **Computer Configuration > Policies > Windows Settings > Security Settings > Public Key Policies**.
3. In the right pane, right-click **Certificate Services Client - Auto - Enrollment**, then select **Properties** to open the Auto-Enrollment Settings Properties page.
4. Make sure that **Enabled** is selected for Configuration Model and check the following boxes:
   - **Renew expired certificate, update pending certificates, and remove revoked certificates**.
   - **Update certificates that use certificate templates**.
5. Click **OK** to save the auto-enrollment settings.

Creating a certificate template with auto-enrollment permission

The isolation and encryption service supports certificate templates that use RSA or Elliptic Curve Cryptography (ECC) algorithms. For details about using the ECC algorithm, see Using the ECC algorithm in a certificate template.

To configure a template with auto-enrollment:

1. Open the MMC Certificate Template snap-in.

   Another way to open the Certificate Template console is to open the Certificate Authority console, select **Certificate Templates**, then right-click and select **Manage**.
2. Select a template, then right-click and select **Duplicate Template** to

create a new template that you can modify.

For example, select the Workstation Authentication template.

3. On the Properties page for the new template, do the following:
    a. Select the **General** tab and enter a name for the template.
    b. Select the **Security** tab and select **Domain Computers**. Then select **Read** and **Autoenroll** permissions.
    c. Select the **Extensions** tab. Then select **Application Policies**.
    d. Click **Edit**. **Client Authentication** should already be shown.
    e. Click **Add**, then scroll and select **Server Authentication**.
    f. Click **OK**.
4. Click **OK** to save the new template.

Using the ECC algorithm in a certificate template

If you wish to use the ECC algorithm in your certificate template, be aware of the following points:

- Older versions of Windows do not support the ECC algorithm. When you create the certificate template, be sure to set the compatibility settings for both the CA and the certificate recipient to Windows Server 2008 or newer.
- You specify the ECC algorithm on the Cryptography tab, with the following settings:
    - Provider category: Key Storage Provider
    - Algorithm name: Select either ECDH_P256, ECDH_P384, or ECDH_P521.

Assigning the certificate template to the CA

You can now assign the newly created template to the Certificate Authority. Whenever a computer joins the domain, the CA issues a certificate based on the template, and the DirectSecure agent for *NIX downloads the certificate to the computer.

To assign the template to a certificate authority (CA):

1. Open the Certification Authority console.
2. Click **Certification Authority > *CA_name* > Certificate Templates**, where ***CA_name*** is the container for the CA you set up earlier. See Preparing a computer to be a Certificate Authority (CA).
3. Right-click and select **New > Certificate Template to Issue**. Select the template you just created and click **OK**.

The root CA is now set up to issue certificates based on the template you created.

Understanding how the isolation and encryption service updates CRLs

Generating a certificate revocation list (CRL) is the method a Certificate Authority (CA) uses to maintain the validity of the certificates that it issues. A CRL contains a list of certificates (or more specifically, a list of serial numbers for certificates) that have been revoked or are no longer valid, and therefore should not be relied upon. The isolation and encryption service retrieves CRLs from CAs after specific events (such as joining a domain) and at specific intervals to determine which certificates, if any, have been revoked, and thus whether to request new certificates.

Note The current version of the isolation and encryption service only supports complete certificate lists, not delta CRLs, which only describe the updates since the complete list was published.

Generating a CRL

A CRL is generated by a CA and contains a list of certificates to revoke from the list of certificates that the CA has issued.

Typically, a CA automatically generates a CRL at a specified interval, anywhere from two hours to one year, at which point the new CRL with the list of revoked certificates is available for clients to request.

The CRL itself contains the interval period, which allows clients, such as the isolation and encryption service, to determine when to request a new CRL. See

Retrieving a CRL and verifying certificates for information about retrieving CRLs.

In addition to automatic generation of a CRL, Active Directory utilities are available that allow an administrator to manually revoke certificates and publish a CRL on the CA. In this case, the CRL-publishing interval is reset so the next automatic publishing operation will occur in the appropriate amount of time.

Retrieving a CRL and verifying certificates

At specific times (when the UNIX system joins a domain, the administrator issues the `adgpupdate` command, or the group policy refresh interval occurs), the isolation and encryption service performs certain tasks, including determining whether to retrieve a CRL. Specifically, the isolation and encryption service does the following:

- Identifies the CA that issued certificates for the system.
- Looks at the refresh interval in the current CRL to determine whether to retrieve a new CRL.
- If the interval has expired, retrieves a new CRL by using the IIS Web Server for the CA.
- Verifies the currently issued certificates against the CRL and requests new certificates for certificates that have been revoked.

Note When you manually revoke a certificate, it is possible that the certificate will appear as valid even after running the `adgpupdate` command to trigger an IPsec update. When you revoke a certificate, the isolation and encryption service first looks at the current CRL to determine the validity of the certificates that have been issued. In this case, the newly revoked certificate still appears as valid. Immediately afterwards, because of the IPsec update, the isolation and encryption service requests a new CRL. The new CRL shows that the certificate in question is invalid, but the isolation and encryption service will not look at the new CRL until the next scheduled update, or until you run the `adgpupdate` command again. Therefore, to be certain to have current information, if you manually revoke certificates, you can issue the `adgpupdate` command twice in sequence.