Installation Guide

Privileged User Manager 2.3.1

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NetIQ™

Contents

About This Guide

This *Getting Started Guide* explains the hardware requirements for the Privileged User Manager components, then explains how to install the components.

Audience

This guide is intended for users who install and manage the Privileged User Manager product.

Feedback

We want to hear your comments and suggestions about this manual and the other documentation included with this product. Please use the User Comments feature at the bottom of each page of the online documentation, or go to www.novell.com/documentation/feedback.html and enter your comments there.

Documentation Updates

For the most recent version of the *Getting Started Guide*, visit the Privileged User Manager Web Site (http://www.novell.com/documentation/privilegedusermanager23).

Additional Documentation

Privileged User Manager Administration Guide (http://www.novell.com/documentation/privilegedusermanager23/npum_admin/data/bkyzr9y.html)

1 NetIQ Privileged User Manager Overview

NetIQ Privileged User Manager delivers a robust and scalable architecture, intuitive management console and reusable script and command libraries that enable administrators to reduce management overhead and infrastructure costs in your environment.

1.1 Product Overview

Certain situations open potential back doors into systems and increase the likelihood of a security breach in an enterprise network. For example, when running some commands that require elevated privileges, users sometimes get exposed to the superuser or root account credentials. Similarly, passwords are often not changed when a user is no more performing the administrative role.

NetIQ Privileged User Manager helps IT administrators manage the identity and access for superuser and root accounts by providing controlled superuser access to administrators, allowing them to perform jobs without needlessly exposing root account credentials. It also provides a centralized activity log across multiple platforms. The introduction of NetIQ Privileged User Manager enriches the Novell Identity and Access Management and Compliance Management solutions by adding auditing and tracking capabilities for privileged user activity across the organization.

NetIQ Privileged User Manager limits corporate susceptibility to unauthorized transactions and information access by helping organizations rapidly deploy superuser management and tracking across all UNIX and Linux environments. It reduces management overhead and infrastructure costs, controls and records which privileged users have access to what, and reduces costs and errors through demonstrable compliance audits.

NetIQ Privileged User Manager works by delegating privileged access, which is authorized via a centralized database. The end result is that a user is authorized to run the privileged command and all activity is logged. The centralized database provides for easier administration. Compared to competitive solutions in the marketplace, NetIQ Privileged User Manager is deployed more quickly, provides faster response time, better logging and auditing and improved administration, and leads to a more secure system and a fast return on investment.

1.2 Components

Privileged User Manager consists of a Framework Manager, where you manage and configure the system, and an agent, which is installed on each machine where you want to monitor and control superuser access.

Figure 1-1 *Framework Manager*

From the Home page, you have access to six administrative consoles:

- **Compliance Auditor:** Proactive auditing tool that pulls events from the event logs for analysis, according to predefined rules. It pulls filtered audit events at hourly, daily, weekly or monthly intervals. This enables auditors to view prefiltered security transactions, play back recordings of user activity, and record notes for compliance purposes. In an era of increasing regulatory compliance requirements, the ability to supply demonstrable audit compliance at any time provides a more secure system and reduces audit risk.

- **Framework User Manager:** Manages users who log in to the Framework Manager through role-based grouping.

- **Hosts:** Centrally manages Privileged User Manager installation and updates, load-balancing, redundancy of resources, and host alerts.

- **Reporting:** Provides easy access and search capability for event logs and allows you review and color-code user keystroke activity through the Command Risk Analysis Engine.

- **Command Control:** Uses an intuitive graphical interface to manage security policies for privilege management.

- **Package Manager:** Lets you easily update any Privileged User Manager application.

1.3   What's New in 2.3

For information about the new features added in NetIQ Privileged User Manager 2.3 see Privileged User Manager 2.3 Readme (http://www.novell.com/documentation/privilegedusermanager23/).

2 Installation Requirements

2.1 Software Prerequisites

- NetIQ Privileged User Manager installation software. Log in to the Novell Customer Center (http://www.novell.com/center) and follow the link that allows you to download the software.
- Adobe Flash Player.
- NetIQ Privileged User Manager license. Log in to the Novell Customer Center (http://www.novell.com/center) and download the license.

NOTE: By default, new installations are provided with a 90-day license for five agents, one of which is the manager.

2.2 System Requirements

A PUM agent should have the following system requirements:

- CPU - 300 MHz (RISC), 1GHz (CISC)
- Memory - 50 MB additional memory
- Hard Disk - 100 MB additional memory

A PUM manager should have the following system requirements:

- CPU - 1 GHz or more (RISC), 2 GHz or more (CISC)
- Memory - 250 MB additional memory
- Hard Disk - 150 MB additional memory and additional memory for Audit Storage

TIP: Approximate additional memory calculation for Audit Storage = (250 KB) X (number of PUM users) X (number of sessions per day (usually 8 sessions)).

2.3   Supported Platforms

The Framework Manager software has been tested on the following platforms:

- Windows 2008 R2 32-bit and 64-bit
- Windows 2003 32-bit and 64-bit
- Windows 2008 32-bit and 64-bit
- Red Hat 5 32-bit and 64-bit
- Red Hat 6 32-bit and 64-bit
- AIX 5.3 32-bit and 64-bit
- AIX 6.1 32-bit and 64-bit
- SUSE Linux Enterprise Server 10 (SLES) 32-bit and 64-bit
- Open Enterprise Server 2 (32-bit and 64-bit)
- SUSE Linux Enterprise Server 11 (SLES) 32-bit and 64-bit
- Open Enterprise Server 11 (32-bit and 64-bit)
- Ubuntu 10.04 LTS 64-bit
- HP-UX (PA-RISC) 11.11 32-bit and 64-bit
- HP-UX (PA-RISC) 11.23 32-bit and 64-bit
- HP-UX (Itanium) 11.23 64-bit
- Sun Solaris (SPARC) 32-bit and 64-bit on versions 9 and 10
- Sun Solaris (Intel) 32-bit and 64-bit on versions 10

The Framework Agent software has been tested on the following platforms:

- HP Tru64 UNIX 64-bit on 5.1a and 5.1b
- Windows 2008 R2 32-bit and 64-bit
- Windows 2003 32-bit and 64-bit
- Windows 2008 32-bit and 64-bit
- Red Hat 5 32-bit and 64-bit
- Red Hat 6 32-bit and 64-bit
- AIX 5.3 32-bit and 64-bit
- AIX 6.1 32-bit and 64-bit
- SUSE Linux Enterprise Server 10 (SLES) 32-bit and 64-bit
- Open Enterprise Server 2 (32-bit and 64-bit)
- SUSE Linux Enterprise Server 11 (SLES) 32-bit and 64-bit
- Open Enterprise Server 11 (32-bit and 64-bit)
- Ubuntu 10.04 LTS 64-bit
- HP-UX (PA-RISC) 11.11 32-bit and 64-bit
- HP-UX (PA-RISC) 11.23 32-bit and 64-bit
- HP-UX (Itanium) 11.23 64-bit
- Sun Solaris (SPARC) 32-bit and 64-bit on versions 9 and 10
- Sun Solaris (Intel) 32-bit and 64-bit on versions 10

IMPORTANT

- Ensure that your operating system is running the vendor's latest maintenance patches.
- Use the 64 bit installer of Privileged User Manager for the 64 bit Windows platforms.

Third Party Tested Platforms

The agent can be installed on the following Linux platform:

- Univention Corporate Server (UCS) 2.3

2.4 Supported Browsers

To access NetIQ Privileged User Manager, you need to install Adobe Flash Player 9 or above on a supported browser.

The following are the supported browsers:

- Microsoft Internet Explorer 7.0
- Microsoft Internet Explorer 8.0
- Mozilla Firefox 3.6
- Chrome

NOTE: Some features, such as RDP Relay, are supported only on Internet Explorer 8.0.

2.5 Procedural Overview

The following steps are required to install Privileged User Manager:

1 Install a Framework Manager. See Chapter 3, "Installing the Framework Manager," on page 13.

2 When the installation has completed, access and log in to the console. See Section 3.2, "Accessing the Framework Console," on page 18.

3 Install the Privileged User Manager license. See Section 3.3, "Installing a NetIQ Privileged User Manager License," on page 18.

   By default, new installations are provided with a 90-day license for five agents, one of which is the manager. You need to install your license before the default license expires.

4 Set up a Package Manager so you can install additional packages on the agents and push package updates to your framework components. See Section 3.4, "Setting Up a Package Manager," on page 19.

5 Install and register a Framework Agent on the computers that you want to manage. See Chapter 4, "Installing the Agents," on page 25.

   When you have installed and registered the Framework agents, you have completed the installation of the Framework.

6 For configuration information, see the *NetIQ Privileged User Manager 2.3.1 Administration Guide*.

3 Installing the Framework Manager

3.1 Installing a Framework Manager

Currently, the Framework Manager is available for installation on the platforms listed below. Refer to Chapter 2, "Installation Requirements," on page 9 for more information regarding supported versions.

NOTE: After the Framework Manager is installed, the manager console runs on the default port 443 and can be accessed with `https://<ip>`. The default port can be changed by changing the port number in the `connector.xml` file located at `<install_path>/service/local/admin/connector.xml`. For SUSE, the connector.xml file is located at `/etc/opt/novell/npum/service/local/admin/connector.xml`.

For detailed installation instructions for your platform, select from the list below:

3.1.1 AIX Framework Manager Installation

The AIX installation package is compressed through gzip. In order to install the package, you must unzip the package through gunzip.

By default, the installation program installs the software into `/opt/novell/npum`. To change this, create a directory in the required part of the file system and create a symbolic link to `/opt/novell/npum`.

To install the AIX manager:

1 Copy the installation package to a temporary location and use the following command to extract the installation files:

```
gunzip <filename>
```

See the "NetIQ Privileged User Manager Readme" (http://www.novell.com/documentation/privilegedusermanager23/readme/data/privilegedusermanager_readme.html) for the actual filename.

2 After the AIX installation package is uncompressed, use one of the following methods to perform the installation.

- ◆ The AIX smitty program.
- ◆ The following command:

```
installp -acgNQqwX -d <directory of .bff file> netiqnpum
```

3 After installation is complete, check that the service is running by viewing the log file. The log file is located in /opt/novell/npum/logs/unifid.log, if the default install location was used. If the manager installed correctly, services should be listening on 0.0.0.0:29120 and 0.0.0.0:443.

4 If you have been supplied with a license, log in to the Framework Console and install the license.

For information, refer to Section 3.2, "Accessing the Framework Console," on page 18, and then Section 3.3, "Installing a NetIQ Privileged User Manager License," on page 18.

3.1.2 HP-UX Framework Manager Installation

The HP-UX installation package is compressed through gzip. In order to install the package, you must unzip the package through gunzip.

By default, the installation program installs the software into /opt/novell/npum. To change this, create a directory in the required part of the file system and create a symbolic link to /opt/novell/npum.

To install the HP-UX manager:

1 Copy the installation package to a temporary location and use the following command to extract the installation files:

```
gunzip <filename>
```

See the "NetIQ Privileged User Manager Readme" (http://www.novell.com/documentation/privilegedusermanager23/readme/data/privilegedusermanager_readme.html) for the actual filename.

2 After the HP-UX installation package is uncompressed, use the following command to install the manager:

```
swinstall -s /<directory of .depot file>/<filename>.depot \*
```

3 After installation is complete, check that the service is running by viewing the log file. The log file is located in /opt/novell/npum/logs/unifid.log, if the default install location was used. If the manager installed correctly, services should be listening on 0.0.0.0:29120 and 0.0.0.0:443.

4 If you have been supplied with a license, log in to the Framework Console and install the license.

For information, refer to Section 3.2, "Accessing the Framework Console," on page 18, and then Section 3.3, "Installing a NetIQ Privileged User Manager License," on page 18.

3.1.3 Linux Framework Manager Installation

Linux hosts use the RPM packaging system for installation, upgrade, and removal.

By default, the installation program installs the software into `/opt/novell/npum`. To change this, create a directory in the required part of the file system and create a symbolic link to `/opt/novell/npum`.

To install the Linux manager:

1 Copy the installation package to a temporary location and use the following command to install the file:

`rpm -i <filename>.rpm`

See the "NetIQ Privileged User Manager Readme" (http://www.novell.com/documentation/privilegedusermanager23/readme/data/privilegedusermanager_readme.html) for the actual filename.

2 After installation is complete, check that the service is running by viewing the log file. The log file is located in `/opt/novell/npum/logs/unifid.log`, if the default install location was used. If the manager installed correctly, services should be listening on 0.0.0.0:29120 and 0.0.0.0:443.

3 If you have been supplied with a license, log in to the Framework Console and install the license.

For information, refer to Section 3.2, "Accessing the Framework Console," on page 18, and then Section 3.3, "Installing a NetIQ Privileged User Manager License," on page 18.

3.1.4 SLES Framework Manager Installation

To install a new manager host, you must install base packages, manager packages and other required dependencies.

NOTE:

- For SLES specific RPMs, the open source dependencies must be fulfilled before the RPM is installed using the *RPM* command.

  If the SLES operating system is properly registered and the SLES update channels are configured, you can use the *zypper* command with the SLES specific RPMs which will automatically pull the required open source dependencies from the configured SLES update channels.

- Before installing the manager RPM, install the agent RPM.

To install the SLES manager:

1 Copy the installation package to a temporary location.

See the "NetIQ Privileged User Manager Readme" (http://www.novell.com/documentation/privilegedusermanager23/readme/data/privilegedusermanager_readme.html) for the actual filename.

2 After the SLES installation package is uncompressed, install the SLES manager. To install the SLES manager, you must install the agent package before installing the manager package.

Use the following command to install the SLES manager:

- ◆ **For SLES 11 use zypper:**

```
zypper install <Agent name>.rpm <Manager name>.rpm
```

- ◆ **For SLES 10 use rug:**

```
rug install <Agent name>.rpm <Manager name>.rpm
```

- ◆ **rpm:**

```
rpm -i <Agent name>.rpm
```

```
rpm -i <Manager name>.rpm
```

> **NOTE**: See the "NetIQ Privileged User Manager Readme" (http://www.novell.com/documentation/privilegedusermanager23/readme/data/privilegedusermanager_readme.html) for the actual Agent name and Manager name.

As part of the installation process the zypper or rug command line interfaces automatically resolve the required dependencies. However, if the installation is through the RPM command, the installation will fail if the following dependencies are not installed.

- ◆ `libapr1`
- ◆ `libapr-util1`
- ◆ `openssl`
- ◆ `perl`
- ◆ `apr`
- ◆ `zlib`
- ◆ `pcre`
- ◆ `openldap`

3 After installation is complete, check that the service is running by viewing the log file. The log file is located in `/var/opt/novell/npum/logs/unifid.log`, if the default install location was accepted. If the manager installed correctly, services should be listening on 0.0.0.0:29120 and 0.0.0.0:443.

4 If you have been supplied with a license, log in to the Framework Console and install the license.

For information, refer to Section 3.2, "Accessing the Framework Console," on page 18, and then Section 3.3, "Installing a NetIQ Privileged User Manager License," on page 18.

> **NOTE**: For upgrading to NPUM 2.2.2 on SLES from a previous release, see Section 5.2, "Migrating from Generic Linux 2.2.x to 2.3 on SLES," on page 36.

3.1.5 Solaris Framework Manager Installation

The Solaris installation package is compressed through gzip. In order to install the package, you must unzip the package through gunzip.

By default, the installation program installs the software into `/opt/novell/npum`. To change this, create a directory in the required part of the file system and create a symbolic link to `/opt/novell/npum`.

To install the Solaris manager:

1 Copy the installation package to a temporary location and use the following command to extract the installation files:

```
gunzip <filename>
```

See the "NetIQ Privileged User Manager Readme" (http://www.novell.com/documentation/privilegedusermanager23/readme/data/privilegedusermanager_readme.html) for the actual filename.

2 After the Solaris installation package is uncompressed, use the following command to install the manager:

```
pkgadd -d /<directory of .pkg file>/<filename>.pkg
```

3 After installation is complete, check that the service is running by viewing the log file. The log file is located in `/opt/novell/npum/logs/unifid.log`, if the default install location was accepted. If the manager installed correctly, services should be listening on 0.0.0.0:29120 and 0.0.0.0:443.

4 If you have been supplied with a license, log in to the Framework Console and install the license.

For information, refer to Section 3.2, "Accessing the Framework Console," on page 18, and then Section 3.3, "Installing a NetIQ Privileged User Manager License," on page 18.

3.1.6 Windows Framework Manager Installation

1 Run the following install executable to start the installation:

```
<filename>.exe
```

See the "NetIQ Privileged User Manager Readme" (http://www.novell.com/documentation/privilegedusermanager23/readme/data/privilegedusermanager_readme.html) for the actual filename.

2 Follow the steps in the install wizard.

The Framework Manager service can be installed on any part of the normal file system. It defaults to the `C:\Program Files\Novell\npum` folder.

3 After installation is complete, check that the service is running by viewing the log file. The log file is located in `C:\Program Files\Novell\npum\logs\unifid.log`, if the default install location was used. If the manager installed correctly, services should be listening on 0.0.0.0:29120 and 0.0.0.0:443.

4 If you have been supplied with a license, log in to the Framework Console and install the license.

For information, refer to Section 3.2, "Accessing the Framework Console," on page 18, and then Section 3.3, "Installing a NetIQ Privileged User Manager License," on page 18.

3.2 Accessing the Framework Console

1 Open a Web browser on your chosen platform.

2 In the address bar, enter the URL for the Framework Console as follows:

```
https://<hostname>
```

Replace *<hostname>* with one of the following:

- The DNS name of the server where the Framework Manager is installed.
- The DNS name of a server that has the Administration Agent package installed.

3 If you are presented with a security alert, verify the details and select *Yes* to continue.

4 If your browser is not already equipped with Adobe Flash Player, the browser attempts to install it. Verify the details and select *Install* to continue.

A reboot or browser restart might be required.

5 Log in to the Framework Console.

After you enter the URL for the Framework Console, the initial logon screen is displayed in the browser window. You must authenticate to the system by using a username and password defined on the system.

6 (Conditional) If this is the first time to log in to the console, specify the username `admin` and password `netiq`, then click *Logon*.

7 (Conditional) If this is the first time to log in to the Framework Console, you are prompted to change the default password.

Your new password should be a minimum of eight characters. If the new password is acceptable to the system, you are logged in to the console.

> **IMPORTANT**: To navigate in the Framework Console, do not use your browser's Forward or Back buttons; use the trail at the top of each page, such as:
>
> *Home / Compliance Auditor*
>
> Click *Home* to return to main console menu.

8 Continue with Section 3.3, "Installing a NetIQ Privileged User Manager License," on page 18.

3.3 Installing a NetIQ Privileged User Manager License

Log in to the Novell Customer Center (http://www.novell.com/center) and download your license file. Use the following steps to install it:

1 Log in to the Framework Console.

2 From the *Task Pane*, click *About Framework*.

3 Click *Register Framework*.

4 Copy the supplied license and paste it into the text area.

5 Click *Finish > Close*.

Your license details can be viewed by selecting the *About Framework* option from the *Task Pane*.

6 Continue with one of the following:

- Section 3.4, "Setting Up a Package Manager," on page 19
- Chapter 4, "Installing the Agents," on page 25

3.4   Setting Up a Package Manager

The Package Manager allows you to push updates to hosts and to install additional packages on the hosts for load balancing and failover. To use the Novell Update Server as the Package Manager, see "Configuring the Package Manager " in the *NetIQ Privileged User Manager 2.3.1 Administration Guide*.

To use a local host as a Package Manager:

1 Create a directory such as `framework` on the Framework Manager in the `/tmp` directory.

This directory is called `framework` in the rest of these instructions.

2 Copy the `netiq-npum-packages-2.3.1.gz` from the Package Manager directory on the CD to the machine.

3 Extract the file to the `framework` directory.

For UNIX and Linux platforms, use the following commands:

```
gunzip netiq-npum-packages-2.3.1.tar.gz
tar -xvf netiq-npum-packages-2.3.1.tar
```

For Windows platforms, use WinZip to extract the file.

4 Use the following command to publish the packages to the Package Manager.

Replace *<admin>* with the name of your admin user.

For Linux and UNIX platforms:

```
/opt/novell/npum/sbin/unifi -u <admin> distrib publish -d /tmp/framework
```

For Windows platforms:

```
c:\Program Files\novell\npum\bin\unifi -u <admin> distrib publish -d
c:\tmp\framework
```

5 When prompted, enter the password for the admin user.

6 (Optional) To view available packages, log in to the Framework Manager, then click *Package Manager*.

7 Delete the `framework` directory.

3.5   Stopping and Restarting the Framework

The Framework services and processes start automatically after installation and system reboot, so there is normally no need to stop and restart them. If you need to stop and restart the services and processes manually, follow the instructions below for your platform:

- Section 3.5.1, "AIX," on page 20
- Section 3.5.2, "HP-UX," on page 20
- Section 3.5.3, "Linux," on page 20
- Section 3.5.4, "Solaris," on page 20
- Section 3.5.5, "Windows," on page 21

3.5.1　AIX

To stop the Framework process:

```
stopsrc -s npum
```

To start the Framework process:

```
startsrc -s npum
```

3.5.2　HP-UX

To stop the Framework process:

```
/sbin/init.d/npum stop
```

To start the Framework process:

```
/sbin/init.d/npum start
```

To check the status:

```
/sbin/init.d/npum status
```

3.5.3　Linux

The following instructions apply to all distributions.

To stop the Framework process:

```
/etc/init.d/npum stop
```

To start the Framework process:

```
/etc/init.d/npum start
```

To check the status:

```
/etc/init.d/npum status
```

3.5.4　Solaris

The following instructions apply to all supported distributions.

To stop the Framework process:

```
/etc/init.d/npum stop
```

To start the Framework process:

```
/etc/init.d/npum start
```

To check the status:

```
/etc/init.d/npum status
```

Solaris 10 also uses the SMF (Service Management facility). Example commands are:

```
svcs | grep npum
```

```
legacy_run Apr_21 lrc:/etc/rc3_d/S99npum
```

```
online Apr_21 svc:/application/security/npum:default
```

Then, to enable the Framework process:

```
svcadm enable npum
```

To disable the Framework process:

```
svcadm disable npum
```

To restart the Framework process:

```
svcadm restart npum
```

To clear the Framework process:

```
svcadm clear npum
```

Please refer to your Solaris documentation for full SMF instructions.

3.5.5 Windows

To stop the Framework service:

1 Select the *Start* button.
2 Select *Control Panel*.
3 Select *Administrative Tools*.
4 Select *Services*.
5 Select the *Framework Manager* service.
6 Select *Stop*.

To start the Framework service, follow the above instructions and select *Start*.

3.6 Removing the Framework Manager

3.6.1 AIX Manager Uninstall

1 Use one of the following methods:
   ◆ The AIX smitty program.
   ◆ The following command:
      ```
      installp -u netiqnpum
      ```

IMPORTANT

◆ To uninstall Privileged User Manager, which was upgraded from an earlier version to 2.3.1, use the following command:

```
installp -u novellnpum
```

◆ This action cannot be undone.

2 Delete the /opt/novell/npum directory structure.

Deleting the directory structure removes the existing Framework Host settings from the server, allowing for clean re-installation.

3.6.2 HP-UX Manager Uninstall

1 Enter the following command:

```
swremove netiq-npum
```

IMPORTANT

◆ To uninstall Privileged User Manager, which was upgraded from an earlier version to 2.3.1, use the following command:

```
swremove novell-npum
```

◆ This action cannot be undone.

2 Delete the /opt/novell/npum directory structure.

Deleting the directory structure removes the existing Framework Host settings from the server, allowing for clean re-installation.

3.6.3 Linux Manager Uninstall

1 Enter the following command:

```
rpm - e netiq-npum
```

IMPORTANT

◆ To uninstall Privileged User Manager, which was upgraded from an earlier version to 2.3.1, use the following command:

```
rpm - e novell-npum
```

◆ This action cannot be undone.

2 Delete the /opt/novell/npum directory structure.

Deleting the directory structure removes the existing Framework Host settings from the server, allowing for clean re-installation.

3.6.4 SLES Framework Manager Uninstall

1 Enter the following command:

```
rpm -e novell-pum  novell-pum-manager
```

IMPORTANT: This action cannot be undone.

2 Delete the following from the directory structure:

```
/opt/novell/npum/
/var/opt/novell/npum/
/etc/opt/novell/npum/
```

Deleting the directory structure removes the existing Framework Host settings from the server, allowing for clean re-installation.

3.6.5 Solaris Manager Uninstall

1 Enter the following command:

```
pkgrm netiq-npum
```

IMPORTANT

- To uninstall Privileged User Manager, which was upgraded from an earlier version to 2.3.1, use the following command:

  ```
  pkgrm novell-npum
  ```

- This action cannot be undone.

2 Delete the /opt/novell/npum directory structure.

Deleting the directory structure removes the existing Framework Host settings from the server, allowing for clean re-installation.

3.6.6 Windows Manager Uninstall

1 Select the *Start* button from the Windows task bar.

2 Select *Control Panel*.

3 Select *Add or Remove Programs*.

4 Select *NetIQ Priviledged User Manager* and click *Remove*.

IMPORTANT: This action cannot be undone.

4 Installing the Agents

4.1 Agent Installation Overview

For each computer that you want to manage with the Framework console, you need to do the following:

4.2 Creating a Host Name for Each Agent

Hosts can be organized and grouped into domains.

1 Log in to the Framework Manager console.

2 In the *Navigation Pane,* click *Hosts*.

The *Navigation Pane* displays the current hierarchy for your Framework.

3 (Conditional) If you want to add a subdomain, click *Hosts* in the *Navigation Pane*.

   3a Click *Add Domain* in the *Task Pane*.

   3b Specify a domain name.

   3c Click *Finish*.

4 Select the required domain from the *Navigation Pane*.

5 Click *Add Hosts* from the *Task Pane*.

6 Specify the agent names for the hosts. You can type the names one at a time using one name per line, or paste a list of names.

When you add a host to the Framework, the name does not need to relate to the existing DNS name used to locate the host on your network.

7 Click *Next*.

A list of agent names is displayed.

8 Click *Finish*.

The status of the host is unregistered until the agent is installed and registered.

9 Continue with .

4.3 Opening Firewall Ports

Port 29120 is used for all communications among the Framework managers and the agents. Port 29120 is also used for communications among the Framework agents.

If firewalls separate your Privileged User Manager machines, this port must be opened to traffic in both directions for NetIQ Privileged User Manager to work properly.

The port is specified when the agent is registered with the Framework Manager. If you need to specify a different port because an application is already using port 29120, this new port needs to be opened in the firewall for communication.

4.4 Installing and Registering a Framework Agent

Currently the Framework Agent is available for installation on the platforms listed below. Refer to Section 2.3, "Supported Platforms," on page 10 for more information regarding supported versions.

For detailed installation instructions for your platform, select from the list below:

NOTE: Agents must be registered with the Framework Manager after installation.

4.4.1 AIX Agent Install

The AIX installation package is compressed through gzip. In order to install the package, you must unzip the package through gunzip.

By default, the installation program installs the software into /opt/novell. To change this, create a directory in the required part of the file system and create a symbolic link to /opt/novell.

To install the AIX agent:

1 Copy the installation package to a temporary location and use the following command to extract the installation files:

```
gunzip <filename>
```

See the "NetIQ Privileged User Manager Readme" (http://www.novell.com/documentation/privilegedusermanager23/readme/data/privilegedusermanager_readme.html) for the actual filename.

2 After the AIX installation package is uncompressed, use one of the following methods to perform the installation.

- The AIX smitty program

- The following command:

```
installp -acgNQqwX -d <directory of .bff file> netiqnpum
```

3 When installation is complete, check that the service is running by viewing the log file.

The log file is located in `/opt/novell/npum/logs/unifid.log`, if the default install location was used. If the agent installed correctly, it should be listening on 0.0.0.0:29120.

4 Use the following command to register the agent with the Framework Manager. This command must be issued from the machine where the agent is installed.

`/opt/novell/npum/sbin/unifi regclnt register`

Four items of information are required:

The registration server hostname: The hostname or IP address of the Framework Manager.

The registration server port: Accept the default unless another application is using this port. After the host is registered, this port cannot be modified.

The name or IP address of this host: The DNS name or IP address by which any other agent in the Framework can resolve the location of this machine on your network.

The name of this agent: The name of the agent when it was created in the Framework Console (refer to "Creating a Host Name for Each Agent" on page 25).

NOTE: When the above details have been provided, a valid username and password for the Framework Manager are required to complete the registration of the agent.

---

5 Verify that the registration has been successful by viewing the host details on the Framework Console.

4.4.2 HP-UX Agent Install

The HP-UX installation package is compressed through gzip. In order to install the package, you must unzip the package through gunzip.

By default, the installation program installs the software into `/opt/novell`. To change this, create a directory in the required part of the file system and create a symbolic link to `/opt/novell`.

To install the HP-UX agent:

1 Copy the installation package to a temporary location and use the following command to extract the installation files:

`gunzip <filename>`

See the "NetIQ Privileged User Manager Readme" (http://www.novell.com/documentation/privilegedusermanager23/readme/data/privilegedusermanager_readme.html) for the actual filename.

2 After the HP-UX installation package is uncompressed, use the following command to install the agent:

`swinstall -s /<directory of .depot file>/<filename>.depot \*`

3 After installation is complete, check that the service is running by viewing the log file.

The log file is located in `/opt/novell/npum/logs/unifid.log`, if the default install location was used. If the agent installed correctly, it should be listening on 0.0.0.0:29120.

4 Use the following command to register the agent with the Framework Manager. This command must be issued from the machine where the agent is installed.

`/opt/novell/npum/sbin/unifi regclnt register`

Four items of information are required:

The registration server hostname: The hostname or IP address of the Framework Manager.

The registration server port: Accept the default unless another application is using this port. After the host is registered, this port cannot be modified.

The name or IP address of this host: The DNS name or IP address by which any other agent in the Framework can resolve the location of this machine on your network.

The name of this agent: The name of the agent when it was created in the Framework Console (refer to "Creating a Host Name for Each Agent" on page 25).

NOTE: When the above details have been provided, a valid username and password for the Framework Manager are required to complete the registration of the agent.

5 Verify that the registration has been successful by viewing the host details on the Framework Console.

4.4.3 Linux Agent Installation

Linux hosts use the RPM packaging system for installation, upgrade, and removal.

By default, the installation program installs the software into `/opt/novell`. To change this, create a directory in the required part of the file system and create a symbolic link to `/opt/novell`.

To install the Linux agent:

1 Copy the installation package to a temporary location and use the following command to install the file:

`rpm -i <filename>.rpm`

See the "NetIQ Privileged User Manager Readme" (http://www.novell.com/documentation/privilegedusermanager23/readme/data/privilegedusermanager_readme.html) for the actual filename.

2 After installation is complete, check that the service is running by viewing the log file.

The log file is located in `/opt/novell/npum/logs/unifid.log`, if the default install location was used. If the agent installed correctly, it should be listening on 0.0.0.0:29120.

3 Use the following command to register the agent with the Framework Manager. This command must be issued from the machine where the agent is installed.

`/opt/novell/npum/sbin/unifi regclnt register`

Four items of information are required:

The registration server hostname: The hostname or IP address of the Framework Manager.

The registration server port: Accept the default unless another application is using this port. After the host is registered, this port cannot be modified.

The name or IP address of this host: The DNS name or IP address by which any other agent in the Framework can resolve the location of this machine on your network.

The name of this agent: The name of the agent when it was created in the Framework Console (refer to "Creating a Host Name for Each Agent" on page 25).

NOTE: When the above details have been provided, a valid username and password for the Framework Manager are required to complete the registration of the agent.

---

4 Verify that the registration has been successful by viewing the host details on the Framework Console.

4.4.4   SLES Agent Installation

SLES hosts use the RPM packaging system for installation, upgrade and removal. You can also use the zypper or rug command line interface.

By default, the installation program installs the software into /opt/novell. To change this, create a directory in the required part of the file system and create a symbolic link to /opt/novell.

To install the SLES agent:

1 Copy the installation package to a temporary location and use the following command to install the file:

rpm -i *<filename>*.rpm

See the "NetIQ Privileged User Manager Readme" (http://www.novell.com/documentation/privilegedusermanager23/readme/data/privilegedusermanager_readme.html) for the actual filename.

2 After installation is complete, check that the service is running by viewing the log file.

The log file is located in /var/opt/novell/npum/logs/unifid.log, if the default install location was used. If the agent installed correctly, it should be listening on 0.0.0.0:29120.

3 Use the following command to register the agent with the Framework Manager. This command must be issued from the machine where the agent is installed.

/opt/novell/npum/sbin/unifi regclnt register

Four items of information are required:

The registration server hostname: The hostname or IP address of the Framework Manager.

The registration server port: Accept the default unless another application is using this port. After the host is registered, this port cannot be modified.

The name or IP address of this host: The DNS name or IP address by which any other agent in the Framework can resolve the location of this machine on your network.

The name of this agent: The name of the agent when it was created in the Framework Console (refer to "Creating a Host Name for Each Agent" on page 25).

NOTE: When the above details have been provided, a valid username and password for the Framework Manager are required to complete the registration of the agent.

---

4 Verify that the registration is successful by viewing the host details on the Framework Console.

4.4.5   Windows Agent Installation

1 Run the following install executable to start the installation:

<filename>.exe

See the "NetIQ Privileged User Manager Readme" (http://www.novell.com/documentation/privilegedusermanager23/readme/data/privilegedusermanager_readme.html) for the actual filename.

2 Follow the steps in the install wizard.

The Agent service can be installed on any part of the normal file system. It defaults to the `C:\Program Files\Novell\npum` folder.

3 After installation is complete, check that the service is running by viewing the log file.

The log file is located in `C:\Program Files\Novell\npum\logs\unifid.log`, if the default install location was used. If the agent installed correctly, services should be listening on 0.0.0.0:29120 and 0.0.0.0:443.

4 Use the following command to register the agent with the Framework Manager. This command must be issued from the machine where the agent is installed.

`<install_path>/novell/npum/bin/unifi.exe regclnt register`

Four items of information are required:

The registration server hostname: The hostname or IP address of the Framework Manager.

The registration server port: Accept the default unless another application is using this port. After the host is registered, this port cannot be modified.

The name or IP address of this host: The DNS name or IP address by which any other agent in the Framework can resolve the location of this machine on your network.

The name of this agent: The name of the agent when it was created in the Framework Console (refer to "Creating a Host Name for Each Agent" on page 25).

NOTE: When the above details have been provided, a valid username and password for the Framework Manager are required to complete the registration of the agent.

5 If you have been supplied with a license, log in to the Framework Console and install the license.

For information, refer to Section 3.2, "Accessing the Framework Console," on page 18, and then Section 3.3, "Installing a NetIQ Privileged User Manager License," on page 18.

4.4.6 Solaris Agent Install

The Solaris installation package is compressed through gzip. In order to install the package, you must unzip the package through gunzip.

By default, the installation program installs the software into `/opt/novell`. To change this, create a directory in the required part of the file system and create a symbolic link to `/opt/novell`.

To install the Solaris agent:

1 Copy the installation package to a temporary location and use the following command to extract the installation files:

`gunzip <filename>`

See the "NetIQ Privileged User Manager Readme" (http://www.novell.com/documentation/privilegedusermanager23/readme/data/privilegedusermanager_readme.html) for the actual filename.

2 After the Solaris installation package is uncompressed, use the following command to install the agent:

`pkgadd -d /<directory of .pkg file>/<filename>.pkg`

See the "NetIQ Privileged User Manager Readme" (http://www.novell.com/documentation/privilegedusermanager23/readme/data/privilegedusermanager_readme.html) for the actual filename.

3 After installation is complete, check that the service is running by viewing the log file.

The log file is located in `/opt/novell/npum/logs/unifid.log`, if the default install location was used. If the agent installed correctly, it should be listening on 0.0.0.0:29120.

4 Use the following command to register the agent with the Framework Manager. This command must be issued from the machine where the agent is installed.

`/opt/novell/npum/sbin/unifi regclnt register`

Four items of information are required:

The registration server hostname: The hostname or IP address of the Framework Manager.

The registration server port: Accept the default unless another application is using this port. After the host is registered, this port cannot be modified.

The name or IP address of this host: The DNS name or IP address by which any other agent in the Framework can resolve the location of this machine on your network.

The name of this agent: The name of the agent when it was created in the Framework Console (refer to "Creating a Host Name for Each Agent" on page 25).

NOTE: When the above details have been provided, a valid username and password for the Framework Manager are required to complete the registration of the agent.

5 Verify that the registration has been successful by viewing the host details on the Framework Console.

4.4.7 Tru64 Agent Install

The Tru64 installation package is compressed through gunzip. In order to install the package you must unzip the package through gunzip.

By default, the installation program installs the software into `/opt/novell`. To change this, create a directory in the required part of the file system and create a symbolic link to `/opt/novell`.

To install the Tru64 agent:

1 Copy the installation package to a temporary location and use the following command to extract the installation files:

```
gunzip <filename>
tar –xvf <filename>
```

See the "NetIQ Privileged User Manager Readme" (http://www.novell.com/documentation/privilegedusermanager23/readme/data/privilegedusermanager_readme.html) for the actual filename.

2 After the Tru64 installation package is uncompressed, use the following command to install the agent:

```
setld -l NETIQNPUM/
```

3 After installation is complete, check that the service is running by viewing the log file.

The log file is located in `/opt/novell/npum/logs/unifid.log`, if the default install location was used. If the agent installed correctly, it should be listening on 0.0.0.0:29120.

4 Use the following command to register the agent with the Framework Manager. This command must be issued from the machine where the agent is installed.

```
/opt/novell/npum/sbin/unifi regclnt register
```

Four items of information are required:

The registration server hostname: The hostname or IP address of the Framework Manager.

The registration server port: Accept the default unless another application is using this port. After the host is registered, this port cannot be modified.

The name or IP address of this host: The DNS name or IP address by which any other agent in the Framework can resolve the location of this machine on your network.

The name of this agent: The name of the agent when it was created in the Framework Console (refer to "Creating a Host Name for Each Agent" on page 25).

NOTE: When the above details have been provided, a valid username and password for the Framework Manager are required to complete the registration of the agent.

5 Verify that the registration has been successful by viewing the host details on the Framework Console.

4.5   Removing the Agent Components

4.5.1   AIX Agent Uninstall

1 Use one of the following methods:

- The AIX smitty program
- The following command:

```
installp -u netiqnpum
```

IMPORTANT

- To uninstall Privileged User Manager, which was upgraded from an earlier version to 2.3.1, use the following command:

```
installp -u novellnpum
```

- This action cannot be undone.

2 Delete the `/opt/novell/npum` directory.

Deleting the directory structure removes the existing Framework Host settings from the server, allowing for clean re-installation.

4.5.2 HP-UX Agent Uninstall

1 Enter the following command:

```
swremove netiq-npum
```

IMPORTANT

◆ To uninstall Privileged User Manager, which was upgraded from an earlier version to 2.3.1, use the following command:

```
swremove novell-npum
```

◆ This action cannot be undone.

2 Delete the `/opt/novell/npum` directory structure.

Deleting the directory structure removes the existing Framework Host settings from the server, allowing for clean re-installation.

4.5.3 Linux Agent Uninstall

1 Enter the following command:

```
rpm -e netiq-npum
```

IMPORTANT

◆ To uninstall Privileged User Manager, which was upgraded from an earlier version to 2.3.1, use the following command:

```
rpm -e novell-npum
```

◆ This action cannot be undone.

2 Delete the `/opt/novell/npum` directory structure.

Deleting the directory structure removes the existing Framework Host settings from the server, allowing for clean re-installation.

4.5.4 SLES Agent Uninstall

1 Enter the following command:

```
rpm -e novell-pum
```

IMPORTANT: This action cannot be undone.

2 Delete the following from the directory structure:

```
/opt/novell/npum
```

```
/var/opt/novell/npum
```

```
/etc/opt/novell/npum
```

Deleting the directory structure removes the existing Framework Host settings from the server, allowing for clean re-installation.

4.5.5 Solaris Agent Uninstall

1 Enter the following command:

```
pkgrm netiq-npum
```

IMPORTANT

◆ To uninstall Privileged User Manager, which was upgraded from an earlier version to 2.3.1, use the following command:

```
pkgrm novell-npum
```

This action cannot be undone.

---

2 Delete the /opt/novell/npum directory structure.

Deleting the directory structure removes the existing Framework Host settings from the server, allowing for clean re-installation.

4.5.6 Tru64 Agent Uninstall

1 Enter the following command:

```
setld -d NETIQNPUM230
```

IMPORTANT

◆ To uninstall Privileged User Manager, which was upgraded from an earlier version to 2.3.1, use the following command:

```
setld -d NOVELLNPUM230
```

◆ This action cannot be undone.

---

2 Delete the /opt/novell/npum directory structure.

Deleting the directory structure removes the existing Framework Host settings from the server, allowing for clean re-installation.

4.5.7 Windows Agent Uninstall

1 Select the *Start* button from the Windows task bar.

2 Select *Control Panel*.

3 Select *Add or Remove Programs*.

4 Select *NetIQ Priviledged User Manager* and click *Remove*.

IMPORTANT: This action cannot be undone.

---

5 Upgrading NetIQ Privileged User Manager

5.1 Upgrading from 2.2.x to 2.3

1 Publish the 2.3 packages to the Package Manager.

There are multiple ways to accomplish this.

◆ You can use the 2.3 CD and set up your Framework Manager machine to be a local Package Manager. For instructions, see Section 3.4, "Setting Up a Package Manager," on page 19.

◆ You can configure the Package Manager to use the Novell Update Server through your Novell Customer Care account. For instructions, see "Configuring the Package Manager " in the *NetIQ Privileged User Manager 2.3.1 Administration Guide*.

2 (Conditional) If you are using the Novell Update Server, add the packages you need:

2a Click *Package Manager* on the home page of the console, then click *Add Packages*.

2b Configure the *Package Filter* to display the packages you need.

Version: Select 2.3.

Platform: Select your platforms. Make sure you select *Cross Platform*, which displays the console packages that run on all platforms.

Types: Select at least *Console, Module*, and *Patch*.

Components: Select all of them: *Command Control*, *Framework*, and *Miscellaneous*.

2c Select all the packages that are listed. Make sure you select the *Framework Patch*.

2d Click *Next*, then click *Finish* when the packages have been successfully downloaded.

2e To ensure that all packages are up-to-date, click *Check for Updates*.

2f Select any packages that are listed.

2g Click *Next*, then click *Finish* when the packages have been successfully downloaded.

3 To upgrade your Framework Manager:

3a Click *Hosts* on the home page of the console.

3b Select the host that is your Framework Manager, use the arrow to display the packages, then select *Packages*.

3c Click *Update Packages* in the task pane.

The Framework Patch should be displayed. This package must be updated to 2.3 before you can update any other packages. If this package does not display, return to Step 2 and add the Framework Patch for your platform.

3d Select the package, then click *Next*.

3e When the package has installed, click *Finish*.

3f Click *Update Packages* in the task pane.

3g Select the listed packages, then click *Next*.

3h When the packages have installed, click *Finish*.

3i Verify that all packages display a 2.3 version. If they don't, return to Step 2 and add any missing packages.

4 To install new packages available in 2.3 on your Framework Manager:

4a Click *Hosts* on the home page of the console.

4b Select the host that is your Framework Manager, use the arrow to display the packages, then select *Packages*.

4c Click *Install Packages*.

4d Select the *Syslog Emitter*, then click *Next*.

4e When the package has installed, click *Finish*.

5 To upgrade your agents:

5a Click *Hosts* on the home page of the console.

5b Select the hosts that are agents or select the domain containing the agents.

5c Click *Update Packages* in the task pane.

5d Select the Framework Patch, then click *Next*.

5e Click *Update Packages* in the task pane.

5f Select the listed packages, then click *Next*.

5g When the packages have installed, click *Finish*.

5h Verify that all packages display a 2.3 version.

5.2 Migrating from Generic Linux 2.2.x to 2.3 on SLES

- Section 5.2.1, "Migrating Agent," on page 36
- Section 5.2.2, "Migrating Framework Manager," on page 37

5.2.1 Migrating Agent

Before installing the Privileged User Manager Agent 2.3 for SLES base installation package, uninstall the current generic linux agent RPM.

NOTE: As no persistent data is stored on the Privileged User Manager agent, backing up of data is not required. However, if a Framework Manager package is deployed to this host, see Section 5.2.2, "Migrating Framework Manager," on page 37 for upgrade instructions.

To uninstall an earlier version of the Generic Linux agent and install the Privileged User Manager 2.3 SLES agent:

1 Use the following command to query for `novell-npum` RPM

```
rpm -qa | grep novell-npum
```

2 Use the following command to uninstall novell-npum RPM

```
rpm -e  novell-npum
```

3 Remove or rename the `/opt/novell/npum structure`.

4 Specify one of the following commands to install the RPMs depending on your architecture:

```
rpm -i novell-pum-2.3-i586.rpm
```
```
rpm -i novell-pum-2.3-x86_64.rpm
```

5 After the installation is complete, Verify that the service is running by viewing the log file.

The log file is located in `/var/opt/novell/npum/logs/unifid.log`, if the default install location was accepted.

If the agent installed correctly, services should be listening on 0.0.0.0:29120.

6 Use the following command to register the agent with the Framework Manager. Specify the following command from the machine where the agent is installed:

```
/opt/novell/npum/sbin/unifi regclnt register
```

The following information is required:

The registration server hostname: Specify the hostname or IP address of the Framework Manager.

The registration server port: Accept the default unless another application is using the default port. After the host is registered, this port cannot be modified.

The name or IP address of this host: Specify the DNS name or IP address, by using any other agent in the Framework can resolve the location of this machine on your network.

The name of this agent: Specify the name of the agent when it was created in the Framework Console. For more information, see "Creating a Host Name for Each Agent" on page 25.

7 Provide a valid username and password for the Framework Manager are required to complete the registration of the agent.

8 Verify that the registration is successful by viewing the host details on the Framework Console.

5.2.2 Migrating Framework Manager

Prerequisites

- Make sure if you have a functioning Primary and Backup Manager for each module.
- Stop the Privileged User Manager daemon process and take a complete backup of the `/opt/novell/npum` directory structure.
- (Conditional) The Audit Manager data is not synchronized. You must perform additonal steps if the server you are upgrading is an Audit Manager. For more information, see

Synchronizing Audit Manager

If the server you are upgrading is an audit manager, perform the following steps before you upgrade to Privileged User Manager 2.3:

1 On the Audit Manager, disable any encryption of the audit databases.

   1a Click *Reporting* on the home page of the console.

   1b Click *Audit Settings* in the task pane.

   1c Change the Audit Log settings for *cmdctrl* audit database file. Set *Protection* to `none`.

   1d Stop Priviledge User Manager

2 Create a manual backup of the following databases from the `/opt/novell/npum/service/local/audit` folder:

   ◆ `audit.ldb`

   ◆ `cmdctrl*.db`

3 After the new SLES manager is installed, you can copy these files back to the new SLES data folder `/var/opt/novell/npum/service/local/audit` after the new SLES manager is installed

Uninstall and Install Framework Manager

To uninstall an earlier version of Generic Linux Framework Manager and install the Privileged User Manager 2.3 SLES Framework Manager:

1 Specify the following command to query for `novell-npum` RPM.

```
rpm -qa | grep novell-npum
```

2 Specify the following command to unistall `novell-npum` RPM

```
rpm -e  novell-npum
```

3 Install `novell-pum` and `novell-pum-manager` packages.

For more information on installation see, Section 3.1.4, "SLES Framework Manager Installation," on page 15 .

4 (Conditional) For Audit Managers, copy the Audit Manager databases that were manually backed up into the `/var/opt/novell/npum/service/local/audit` after the new SLES manager was installed.

5 Use the following command to register the Privileged User Manager 2.3 for SLES Manager with the Primary Framework Manager. This command must be issued from the Privileged User Manager 2.3 for SLES Manager.

```
/opt/novell/npum/sbin/unifi regclnt register
```

The following items of information are required:

The registration server hostname: The hostname or IP address of the Framework Manager.

The registration server port: Accept the default unless another application is using this port. After the host is registered, this port cannot be modified.

The name or IP address of this host: The DNS name or IP address by which any other agent in the Framework can resolve the location of this machine on your network.

The name of this agent: The name of the agent when it was created in the Framework Console (refer to "Creating a Host Name for Each Agent" on page 25).

6 When the above details areprovided, a valid username and password for the Framework Manager are required to complete the registration of the manager.

7 Verify that the registration is successful by viewing the host details on the Framework Console.

8 All databases except for the Audit database will be synchronized to the Privileged User Manager 2.3 server as backup databases. It might take sometimefor the synchronization to be completed.

5.3 Upgrading from SLES 2.2.x to 2.3

- Section 5.3.1, "Upgrading Agent," on page 39
- Section 5.3.2, "Upgrading Framework Manager," on page 39

5.3.1 Upgrading Agent

Use the following command to upgrade Agent from SLES 2.2.x to 2.3:

- **32-bit architecture:** `rpm -U novell-pum-2.3-i586.rpm`
- **64-bit architecture:** `rpm -U novell-pum-2.3-x86_64.rpm`

5.3.2 Upgrading Framework Manager

Use the following command to upgrade Framework Manager from SLES 2.2.x to 2.3:

- **32-bit architecture:** `rpm -U novell-pum-manager-2.3-i586.rpm`
- **64-bit architecture:** `rpm -U novell-pum-manager-2.3-x86_64.rpm`