CISCO SYSTEMS

Broadband Provisioning Registrar Installation Guide

Software Release 2.0

CONTENTS

FIGURES

Broadband Provisioning Registrar Installation Guide

T A B L E S

Preface

This section describes who should read this guide, how it is organized, and the document conventions used.

Cisco documentation and additional literature are available in a CD-ROM package, which ships with your product. The Documentation CD-ROM, a member of the Cisco Connection Family, is updated monthly. Therefore, it might be more up to date than printed documentation. To order additional copies of the Documentation CD-ROM, contact your local sales representative or call customer service. The CD-ROM package is available as a single package or as an annual subscription. You can also access Cisco documentation on the World Wide Web at http://www.cisco.com, http://www-china.cisco.com, or http://www-europe.cisco.com.

If you are reading Cisco product documentation on the World Wide Web, you can submit comments electronically. Click **Feedback** on the toolbar, and then select **Documentation**. After you complete the form, click **Submit** to send it to Cisco. We appreciate your comments.

Who Should Read This Guide

This installation guide enables system integrators, network administrators, and network technicians to install the Cisco Broadband Provisioning Registrar (BPR) on Solaris 8 operating systems and to set up the Cisco Device Provisioning Engine (DPE).

How This Guide Is Organized

This guide describes how to install BPR on Solaris operating system. The major sections of this guide are described here:

Section	Title	Description
Chapter 1	Overview	Provides general requirements for a successful installation of BPR.
Chapter 2	Preparing To Install Components	Describes considerations you need to take into account as you prepare to install BPR. For example, it describes the individual components of BPR, the order of operations for installing the software, and the BPR databse requirements. It also describes initial steps for installing the software using either a graphical user interface or a command line interface.

Section	Title	Description (continued)
Chapter 3	Installing Components	Describes how to install the individual components of BPR using either the GUI or the CLI.
Chapter 4	Installing In a Lab Environment	Describes how to install a lab version of BPR using either the GUI or the CLI.
Chapter 5	Setting Up a Cisco Device Provisioning Engine	Describes how to configure the Cisco Device Provisioning Engine (DPE).
Appendix A	Network Registrar Configuration File Example	Shows examples of files used to configure Network Registrar for digital set-top boxes (DSTBs) and high-speed data (HSD) deployments.

Document Conventions

This guide uses the following conventions:

- **Boldface** is used for commands, keywords, and buttons.
- *Italic* is used for command input for which you supply values.
- `Screen` font is used for examples of information that are displayed on the screen.
- **`Boldface screen`** font is used for examples of information that you enter.
- UNIX paths are indicated as follows: /tools/list/connections.

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the publication.

Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.roblem.

Related Documentation

Refer to these manuals for additional information:

- *Broadband Provisioning Registrar Version 2.0 Release Notes*
- *Broadband Provisioning Registrar Administrator's Guide*
- *Cisco Content Engine 500 Series Hardware Installation Guide*
- *Cisco Enterprise CDN Software User Guide*
- *Cisco Network Registrar User's Guide*
- *Cisco Network Registrar CLI Reference Guide*

Obtaining Documentation

The following sections explain how to obtain documentation from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at the following URL:

http://www.cisco.com

Translated documentation is available at the following URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation CD-ROM

Cisco documentation and additional literature are available in a Cisco Documentation CD-ROM package, which is shipped with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual subscription.

Ordering Documentation

Cisco documentation is available in the following ways:

- Registered Cisco Direct Customers can order Cisco product documentation from the Networking Products MarketPlace:

  http://www.cisco.com/cgi-bin/order/order_root.pl

- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:

  http://www.cisco.com/go/subscription

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco corporate headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

Documentation Feedback

If you are reading Cisco product documentation on Cisco.com, you can submit technical comments electronically. Click **Feedback** at the top of the Cisco Documentation home page. After you complete the form, print it out and fax it to Cisco at 408 527-0730.

You can e-mail your comments to bug-doc@cisco.com.

To submit your comments by mail, use the response card behind the front cover of your document, or write to the following address:

Cisco Systems
Attn: Document Resource Connection
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

Cisco provides Cisco.com as a starting point for all technical assistance. Customers and partners can obtain documentation, troubleshooting tips, and sample configurations from online tools by using the Cisco Technical Assistance Center (TAC) Web Site. Cisco.com registered users have complete access to the technical support resources on the Cisco TAC Web Site.

Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com is a highly integrated Internet application and a powerful, easy-to-use tool that provides a broad range of features and services to help you to

- Streamline business processes and improve productivity
- Resolve technical issues with online support
- Download and test software packages
- Order Cisco learning materials and merchandise
- Register for online skill assessment, training, and certification programs

You can self-register on Cisco.com to obtain customized information and service. To access Cisco.com, go to the following URL:

http://www.cisco.com

Technical Assistance Center

The Cisco TAC is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two types of support are available through the Cisco TAC: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Inquiries to Cisco TAC are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.

- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.

- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

Which Cisco TAC resource you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

Cisco TAC Web Site

The Cisco TAC Web Site allows you to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to the following URL:

http://www.cisco.com/tac

All customers, partners, and resellers who have a valid Cisco services contract have complete access to the technical support resources on the Cisco TAC Web Site. The Cisco TAC Web Site requires a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to the following URL to register:

http://www.cisco.com/register/

If you cannot resolve your technical issues by using the Cisco TAC Web Site, and you are a Cisco.com registered user, you can open a case online by using the TAC Case Open tool at the following URL:

http://www.cisco.com/tac/caseopen

If you have Internet access, it is recommended that you open P3 and P4 cases through the Cisco TAC Web Site.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses issues that are classified as priority level 1 or priority level 2; these classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer will automatically open a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to the following URL:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled; for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). In addition, please have available your service agreement number and your product serial number.

Overview

Broadband Provisioning Registrar (BPR) automates the process of configuring and provisioning cable network devices. BPR interfaces with Cisco Network Registrar, which includes a high-speed DHCP server for IP address management and a DNS server.

This chapter describes:

- Operating system requirements
- Cisco Network Registrar requirements
- Hardware requirements
- Types of installations
- Methods of installation

Operating System Requirement

You must install BPR on a computer running the Solaris 8 operating system with the correct level of software patches installed.

Network Registrar Requirements

Before you install BPR, be aware of the following Cisco Network Registrar requirements:

- BPR requires Network Registrar 5.0.9 or greater.
- You must first install a Solaris 8 Network Registrar DHCP server.
- In a failover deployment of BPR, you must configure two redundant DHCP servers for failover.
- After you install BPR, ensure that Network Registrar scopes are configured to reflect failover capability and the topology of the network on which BPR is installed.

For more information about configuring failover on Network Registrar servers, see the *Network Registrar User's Guide*.

Hardware Requirements

A BPR installation requires the following servers:

- A regional distribution unit (RDU). This is the primary server in a BPR deployment. It contains the central BPR database and manages the generation of configurations.

- One or more device provisioning engines (DPE). A Cisco Device Provisioning Engine caches provisioning information and handles all configuration requests including downloading configuration files to devices. It is integrated with the Cisco Network Registrar DHCP server to control the assignment of IP addresses. Multiple DPEs can communicate with a single DHCP server. DPEs come with factory installed software that enables provisioning, but you must perform some initial set up.

> **Note**   The hardware installation procedure for the Device Provisioning Engine is the same as the procedure for installing the Cisco Content Engine. These procedures are described in the *Cisco Content Engine 500 Series Hardware Installation Guide*. For more information, see that guide. For more information about the front and rear panel, the ports, receptacles, and rack mounting, see the *Cisco Content Engine 500 Series Site Preparation and Safety Guide*.

- One or more Cisco Network Registrar servers. Network Registrar provides Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS) functionality. Implementing dynamic DNS (DDNS) within Network Registrar increases the number of servers you need to deploy.

Table 1-1 describes the hardware requirements for each server.

> **Note**   At a minimum, you need one DPE for every 250,000 devices or for a provisioning group. Be aware that the minimum number does not provide redundancy. For redundancy, use the recommended number of DPEs, as described in Table 1-1. Likewise, be aware that the minimum number of Network Registrar servers listed in Table 1-1 does not provide failover capability. For failover, use the recommended number of servers. If you intend to implement dynamic DNS (DDNS) within Network Registrar, you need additional servers.

Table 1-1   Broadband Provisioning Registrar Hardware Considerations

Number of Devices	Server Type	Minimum Number of Servers	Recommended Number of Servers	Recommended Number of Servers (with DNS)	Server Class	Number of Processors	Memory
100 (Lab use)		1	1	1	Netra T1	1	1GB

Note   A single server device is required to support the RDU, DPE, and Network Registrar in a lab installation.

Table 1-1   Broadband Provisioning Registrar Hardware Considerations (continued)

Number of Devices	Server Type	Minimum Number of Servers	Recommended Number of Servers	Recommended Number of Servers (with DNS)	Server Class	Number of Processors	Memory
250,000	RDU	1	1	1	E220	1	1 GB
	DPE	1	2	2	N/A	N/A	N/A
	NR	1	2	3	Netra T1	1	512 MB
500,000	RDU	1	1	1	T4	2	2 GB
	DPE	2	4	4	N/A	N/A	N/A
	NR	2	4	6	Netra T1	1	512 MB
750,000	RDU	1	1	1	T4	2	2 GB
	DPE	3	6	6	N/A	N/A	N/A
	NR	3	6	9	Netra T1	1	512 MB
1,000,000	RDU	1	1	1	U80	4	2 GB
	DPE	4	8	8	N/A	N/A	N/A
	NR	4	8	12	Netra T1	1	512 MB

Types of Installations

This guide discusses two types of installations:

- Individual component installation—The installation program enables you to install one or more individual components of BPR. The individual components are the RDU, Cisco Network Registrar extensions, and the application programming interface (API). Refer to Chapter 3, "Installing Components" for specifics about installing the individual components.

- Lab installation—The installation program enables you to install BPR for use in a laboratory environment for demonstration or evaluation prior to deploying BPR into a full network implementation. Refer to Chapter 4, "Installing In a Lab Environment" for more information.

You can install BPR from the installation program's graphical user interface (GUI) or from the Solaris command line.

Preparing To Install Components

This chapter provides the information you need to prepare for a successful BPR component installation.

This chapter contains the following topics:

- BPR components
- Order of operations
- BPR database requirements
- Installation checklist
- Initial installation steps

Broadband Provisioning Registrar Components

The BPR installation program prompts you to install one or more of the following components:

- Regional Distribution Unit (RDU). The RDU is the primary server in the BPR provisioning system. You should install the RDU on a Solaris 8 server that meets the requirements described in the "Hardware Requirements" section on page 1-2. The RDU performs these functions:
  - Manages the generation of device configurations
  - Acts as a clearinghouse though which all application programming interface (API) requests must pass
  - Manages the BPR system
- Cisco Network Registrar extensions. These extensions are the link between BPR and Network Registrar. Install this component on all Network Registrar servers in your BPR environment. If you are deploying BPR in a failover environment, you must also install the extensions on the failover servers.

✏️ **Note** Install the BPR Network Registrar extensions on a server running Network Registrar 5.0.9 or greater.

- Application programming interface (API) client. If you develop your own software that you want to interoperate with the RDU, install the API component on the same client workstation on which your software is installed.

Although the installation program supports installing the three components on the same computer, in practice, you are likely to run the program on at least three computers:

1. Installing the RDU on a Solaris 8 server as described in the "Hardware Requirements" section on page 1-2.

2. Installing the Network Registrar extensions on a Network Registrar server or servers.

3. Installing the client API on one or more client workstations.

Order of Operations

To ensure a smooth installation and startup process, follow the order of operations listed in Table 2-1.

Table 2-1   Order of Operations

Item	Description
1.	Determine which components you are installing and on what computers.
2.	Verify the file system block size of the directory in which you intend to install the BPR database and database transaction log files. See the "Broadband Provisioning Registrar Database Requirements" section on page 2-3.
3.	Review the installation checklist. See the "Installation Checklist" section on page 2-4.
4.	Install the RDU. When you install the RDU, ensure that you do the following: • Obtain a valid BPR license key for each technology that you provision. • Configure syslog for alerts. See the "Configuring the Syslog to Receive Alerts from BPR" section on page 3-23. • Validate the installation by running the administrators user interface. For more information, see the *Broadband Provisioning Registrar Administrator's Guide*. • Change the BPR administrator's password. For more information, see the *Broadband Provisioning Registrar Administrator's Guide*.

Table 2-1   Order of Operations (continued)

Item	Description
5.	Install and configure Network Registrar 5.0.9 or greater, if it is not already installed on your systems. For more information, see the *Network Registrar Installation Guide*. When you install Network Registrar, ensure that you do the following: • Obtain a valid Network Registrar license key. • On all Network Registrar servers, install the BPR extensions for the product. For more information see the "Installing Extensions on a Network Registrar Server" section on page 3-8. • Configure Network Registrar, including its extensions. Specifically, you need to configure scopes, policies, client-classes, and scope selection tags. For more information, see the "Configuring Extensions" section on page 3-13, and also see the *Network Registrar User's Guide*. • Configure the syslog on the Network Registrar for alerts and debugging information. See the "Configuring the Syslog to Receive Alerts from BPR" section on page 3-23. • Validate the installation by connecting to a BPR regional distribution unit (RDU) and viewing the administrator's user interface. For more information, see the *Broadband Provisioning Registrar Administrator's Guide*.
6.	If you intend to develop software that interoperates with BPR, install the BPR application programming interface on client workstations.

Broadband Provisioning Registrar Database Requirements

Before you install BPR, be aware of the following database considerations:

- File system block size
- Support for large files

File System Block Size

For optimum performance and reliability of the BPR database, configure the file system or systems that contain the database files and database log files with an 8 KB block size or greater. If your system configuration does not support an 8 KB block size, then configure the block size in multiples of 8 KB; for example, 16 KB or 32 KB.

The installation program prompts you to specify a directory in which to install database files and database log files. These directories are identified in BPR with system variables, BPR_DATA and BPR_DBLOG respectively.

To verify that a directory resides on a file system with an 8 KB block size, follow these steps:

Step 1 Run the UNIX **mount** command without any parameters to determine on which file system device the directory resides. The default directory is /var/CSCObpr.

Example output from the **mount** command is as follows:

```
/var on /dev/dsk/c0t0d0s4 read/write/setuid/intr/largefiles/onerror=panic/dev=2200004 on
Mon Nov 26 08:07:53 2001
```

In this example, the file system device is /dev/dsk/c0t0d0s4.

Step 2   To determine the file system block size, use the **df** command. For example:

```
# df -g /dev/dsk/c0t0d0s4
```

Example output from the **df** command is as follows:

```
/var               (/dev/dsk/c0t0d0s4 ):       8192 block size          1024 frag size
  961240 total blocks      851210 free blocks   755086 available        243712 total files
  239730 free files     35651588 filesys id
     ufs fstype        0x00000004 flag                255 filename length
```

In this example, the block size is 8192 bytes, which is 8 KB. The block size of the selected directory, therefore, is correct.

Large File Support

Ensure that the file system in which you place database files is configured to support files above 2 GB.

To verify large file support, follow these steps:

Step 1   Run the UNIX **mount** command without parameters.

Step 2   Note whether the intended file system contains the keyword **largefiles**.

Example output from the **mount** command is as follows:

```
/var on /dev/dsk/c0t0d0s4 read/write/setuid/intr/largefiles/onerror=panic/dev=2200004 on
Mon Nov 26 08:07:53 2001
```

In this example, the output contains the keyword **largefiles**. This file system, therefore, can support files greater that than 2 GB.

Installation Checklist

Before you run the installation software, use the following checklist to ensure that you are ready:

- Verify the prerequisite system hardware and software requirements described in Chapter 1, "Overview."

- Have your BPR license key or keys at hand. You need a valid license key for each technology that you want to provision with BPR.

- Ensure that you have *root* access to the computers where you intend to install BPR components.

- Verify that Network Registrar 5.0.9 or greater is installed on any servers where you are installing BPR extensions.

- Determine the home directory (BPR_HOME) in which you want to install the BPR component or components. (The default directory is /opt/CSCObpr.)

    Note   Cisco Systems recommends that you have at least 50 MB of disk space available.

- For the RDU, determine where you want to install the data directory (BPR_DATA) and the database transaction logs (BPR_DBLOG). (The default directory is /var/CSCObpr.)

- For Network Registrar extensions, determine where you want to install the data directory (BPR_DATA).

✎
Note   Cisco Systems recommends that you install the database transaction logs on a different physical disk than either the home directory or the data directory.

- For the RDU, select the shared secret password that BPR servers on your network use as a token to authenticate communication with one another. The shared secret password is the same for all BPR servers on your network.

- For extensions, determine the name of provisioning group to which the Network Registrar server belongs.

- Verify that you have the necessary Network Registrar configuration files, (See Appendix A, "Network Registrar Configuration File Example" for an example of these configuration files.)

Initial Installation Steps

The initial steps in the BPR installation program are identical regardless of the BPR component you are installing. This section describes how to work with the installation program and the initial installation steps.

You install BPR from either a graphical user interface (GUI) or a command line interface (CLI).

Installing from the Graphical User Interface

To install BPR from the GUI follow these initial steps:

Step 1   Using an X-Windows client, log in as *root* on the computer on which you intend to install the BPR component.

Step 2   At the Solaris system prompt, change directory to your CD-ROM drive or other installation media. The installation program, setup.bin, is at the root of this drive.

Step 3   Enter the following command to start the installation program:

```
> setup.bin
```

The installation program verifies that you have installed the required patches to the Solaris 8 operating system and are running a supported version of Network Registrar. When the verification is complete, the Welcome screen appears (Figure 2-1).

✎
Note   If you have not installed the correct patches for the operating system, note the information that the installation program displays. Then, go to the Sun Microsystems web site to obtain the specified patches or their replacements.

Figure 2-1   Broadband Provisioning Registrar Welcome Screen

Step 4   Click **Next**. The Choose Installation Type screen appears (Figure 2-2).

Figure 2-2   Choose Installation Type Screen
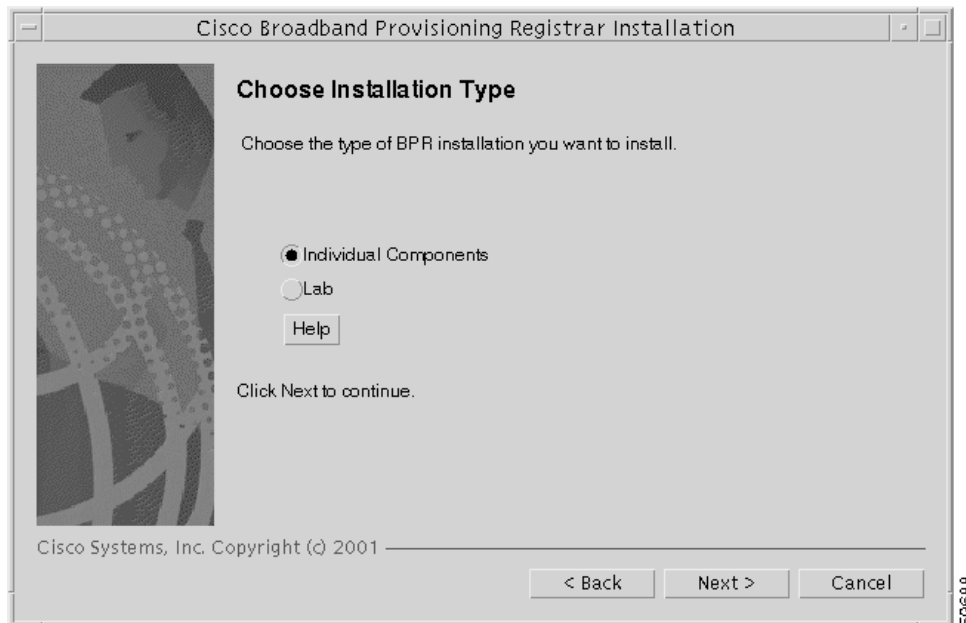
Step 5   Select one of the two installation types:

- Individual Components—This option enables you to install an RDU, Network Registrar extensions, or the application programming interface. See the "Installing the Regional Distribution Unit" section on page 3-1, the "Installing Extensions on a Network Registrar Server" section on page 3-8, or the "Installing the Application Programming Interface" section on page 3-14.

- Lab—This option enables you to install the software in a laboratory environment. See Chapter 4, "Installing In a Lab Environment."

Step 6   Click **Next**. Depending on the option you selected in the preceding step, either the Installation Components screen appears (Figure 2-3), or you begin the lab installation.

Figure 2-3   Installation Components Screen
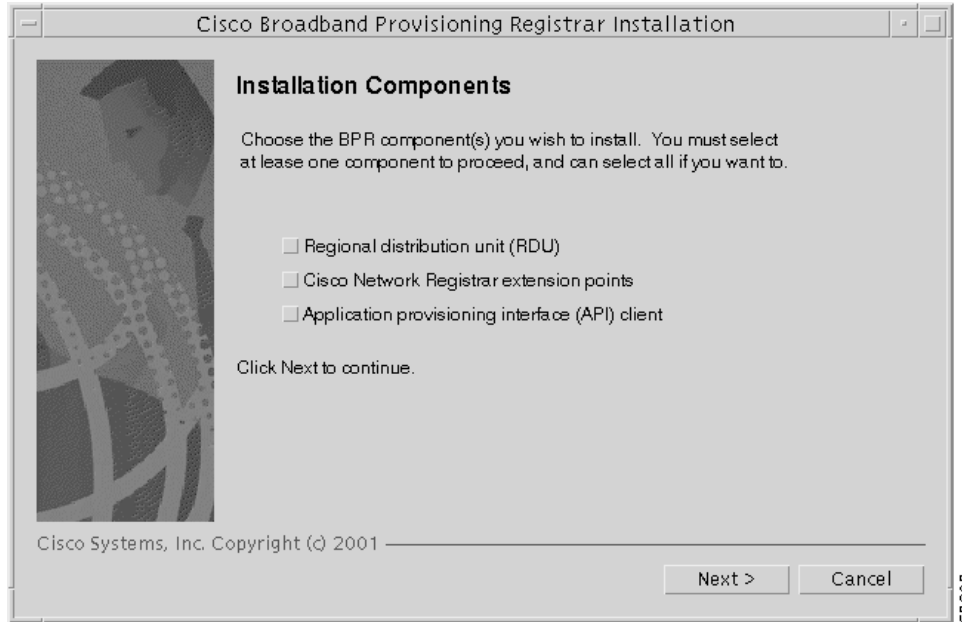
Installing from the Command Line

To perform the initial installation procedure from the command line, follow these steps:

Step 1   Log into the intended BPR host as *root*.

Step 2   At the Solaris system prompt, change directory to your CD-ROM drive or other installation media. The installation program, setup.bin, is at the root of this drive.

Step 3   Enter this command to start the installation program:

```
> setup.bin -console
```

The installation program verifies that you have installed the required patches to the Solaris 8 operating system and a supported version of Network Registrar. When the verification is complete, the program displays welcome information.

Step 4   Press **Enter** to continue. The program prompts you to choose the installation type. You can choose to install:

- Individual components
- Lab installation

Step 5   To choose individual components, enter **C**; or, to choose Lab installation, enter **L**. For example:

```
Choose Installation Type


Choose the type of BPR installation you want to install.


The Lab installation will store all components in the chosen destination.
Otherwise, you can select individual components and destinations.

   Enter C for individual components or L for lab [C]:c
```

The program prompts you to confirm the installation type.

Step 6   Press **y** and then **Enter** to continue.

To install individual components go to the "Installing Components Using the CLI" section on page 3-16. To install in a lab environment go to the"Installing in a Lab Environment Using the CLI" section on page 4-5.

3

Installing Components

This chapter explains the procedures you must follow to correctly install Broadband Provisioning Registrar (BPR) components in a Solaris operating system environment.

This chapter contains the following topics:

- Installing components using the GUI
- Installing components using the CLI
- Uninstalling BPR

Installing Components Using the GUI

This section explains the procedures that you follow to install one or more of components of BPR using the GUI.

You can choose to install one or all of these components:

- Regional distribution unit
- Network Registrar extensions
- Application programming interface (API)

For more information about each component see the "Broadband Provisioning Registrar Components" section on page 2-1.

Before you begin any of these procedures, you must complete the initial installation procedure. For more information, see the "Initial Installation Steps" section on page 2-5.

Installing the Regional Distribution Unit

Install the RDU server on a Solaris 8 server that meets the requirements described in the "Hardware Requirements" section on page 1-2.

To install the RDU server, complete the steps described in the "Initial Installation Steps" section on page 2-5, then follow these steps:

Step 1 On the Install Components screen (Figure 2-3), select the Regional distribution unit (RDU) option and click **Next** to continue.

The BPR License Key(s) screen appears (Figure 3-1).

Figure 3-1   BPR License Key(s) Screen

Step 2   Enter your license key and click **Add License Key**. The installation program adds the key that you enter to the list of valid keys. If your BPR deployment supports multiple technologies, you need to add a key for each technology.

Step 3   Click **Next**. The Home Directory Destination screen appears (Figure 3-2).

The default directory is /opt/CSCObpr.

Figure 3-2   Home Directory Destination Screen
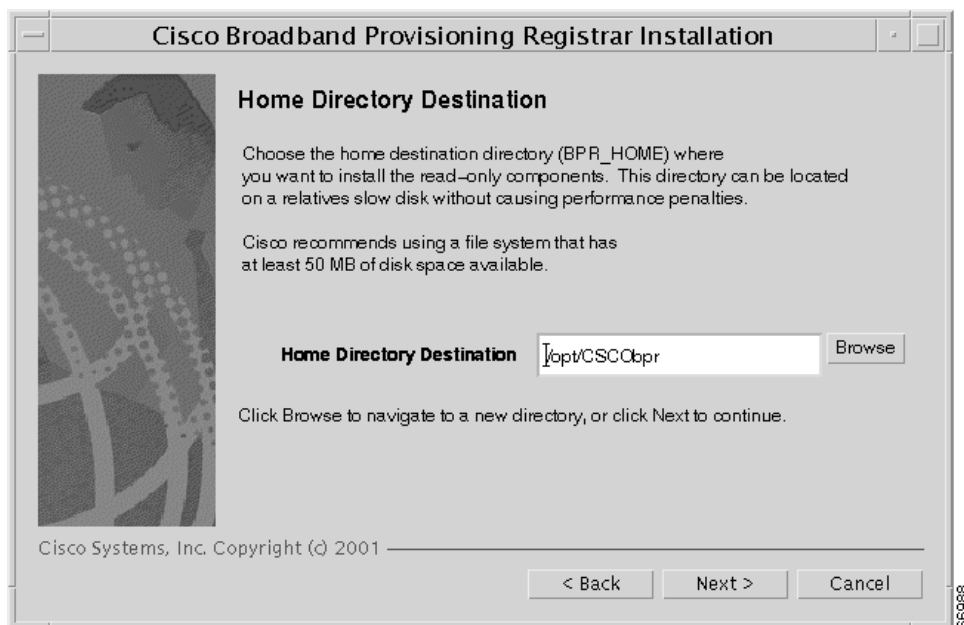
Step 4   Accept the default directory or enter a new directory. You can use the **Browse** button to select a new directory.

Step 5   Click **Next**. The installation program displays the Create Directory dialog box. Click **Yes** to continue.

The Data Directory Destination screen appears (Figure 3-3). The default directory is /var/CSCObpr.

Figure 3-3   Data Directory Destination Screen
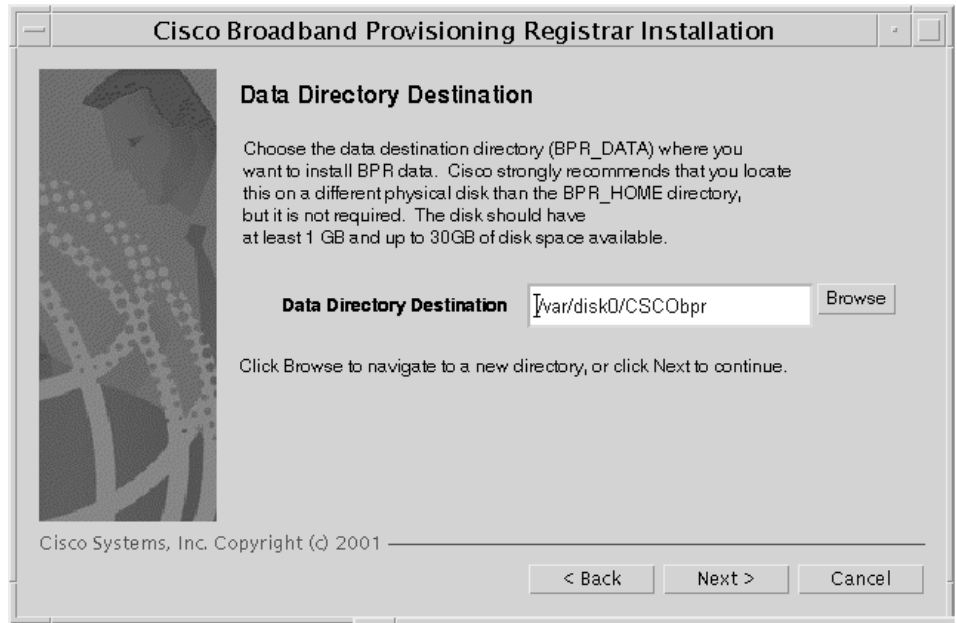
Step 6   Accept the default directory or enter a new directory. You can use the **Browse** button to select a new directory.

> ✎
>
> **Note**   By default, the installation program installs the data directory (BPR_DATA) on a different directory than the home directory (BPR_HOME). Cisco Systems recommends that the data directory be on a different physical disk than the home directory; for example /var/disk0/CSCObpr. However, you can install the data directory on the same disk as the home directory.
>
> The directory specified becomes the top-level directory under which the installation program creates a number of subdirectories; for example, /var/disk0/CSCObpr/rdu/db.

Step 7   Click **Next**. The installation program displays the Create Directory dialog box. Click **Yes** to continue.

The Database Transaction Logs screen appears (Figure 3-4).

Figure 3-4   Database Transaction Logs Screen
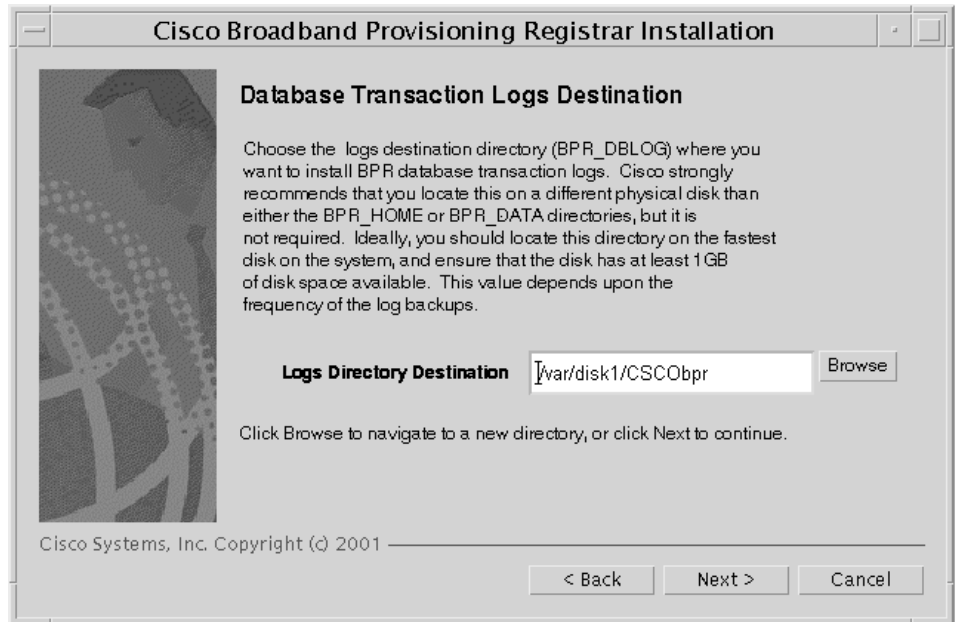
Step 8 Enter the pathname for the directory in which you want the transaction logs (BPR_DBLOG) installed. The default directory is /var/CSCObpr.

> **Note** By default, the installation program installs the database transaction logs directory (BPR_DBLOG) in the same directory as the data directory (BPR_DATA). Cisco Systems recommends that you locate the database transaction logs directory on the fastest disk on the system; for example, /var/disk1/CSCObpr. You also should ensure that the disk has 1 GB of space available.
>
> The directory specified becomes the top-level directory under which the installation program creates a number of subdirectories.

Step 9 Accept the default directory or enter a new directory. You can use the **Browse** button to select a new directory.

Step 10 Click **Next**. The installation program displays the Create Directory dialog box. Click **Yes** to continue.

The Regional Distribution Unit Host/Port screen appears (Figure 3-5).

Figure 3-5   Regional Distribution Unit Host/Port Screen

Step 11   Accept the default listening port number or enter a new port number. The default port is 49187.

✏️ **Note**   The installation program obtains the IP address of the RDU automatically. You do not need to enter this value.

⚠️ **Caution**   If you change the default listening port value, ensure that the new value does not conflict with any existing port assignments. Also, ensure that you configure all DPEs and Network Registrar servers with the correct RDU port number. See the *Broadband Provisioning Registrar Administrator's Guide* for information about configuring the DPE.

Step 12   Click **Next**. The Shared Secret Password screen appears (Figure 3-6).

Figure 3-6   Shared Secret Password Screen

Step 13   Enter and confirm the shared secret password. This password is a token that a BPR server uses to authenticate communication with other BPR servers.

✎
Note   You must use the same shared secret password for all BPR servers on your network.

Step 14   Click **Next**. The Installation Parameters screen appears (Figure 3-7). This screen identifies the values that you have entered in the previous screens. To modify any of the values entered:

a.   Click **Back** until the desired screen appears.

b.   Make the necessary changes.

c.   Click **Next** repeatedly until you return to this screen.

Figure 3-7   Installation Parameters Screen

Step 15   Click **Next**. When the installation is complete, the Installed Components Summary screen appears (Figure 3-8).

Figure 3-8   Installed Components Summary Screen
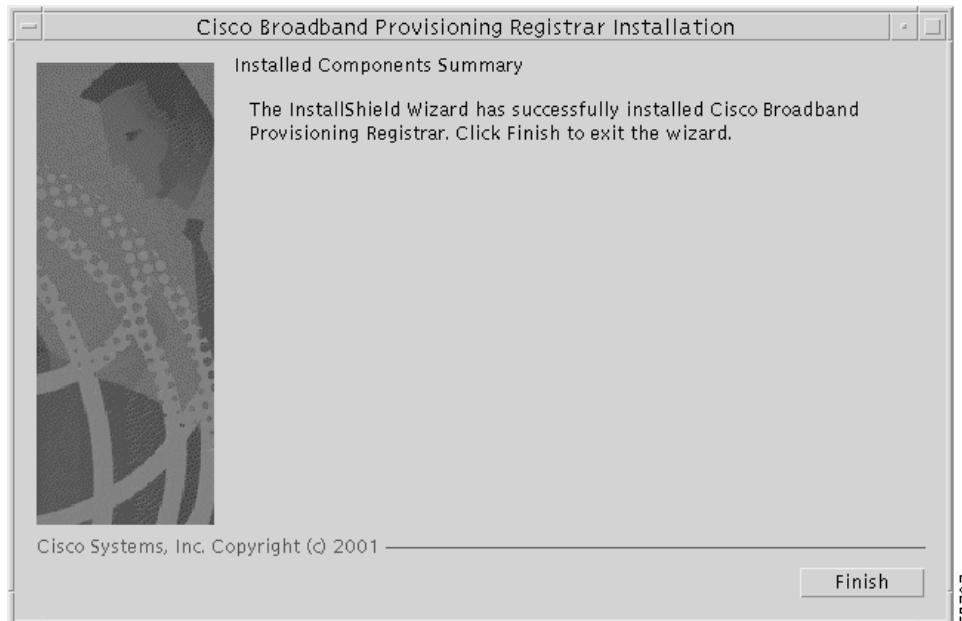
To exit the installation program, click **Finish**.

Installing Extensions on a Network Registrar Server

You install BPR extensions on a Network Registrar server. If you are deploying BPR in a failover environment, you also must install the extensions on the failover servers. After you install extensions, you need to configure them.

The remainder of this section explains how to install and configure the extensions.

Installing Extensions

Before you install the Network Registrar extensions, complete the steps described in the "Initial Installation Steps" section on page 2-5. To install the extensions, follow these steps:

Step 1   On the Install Components screen (Figure 2-3), select the Cisco Network Registrar extension points option and click **Next** to continue; the Home Directory Destination screen appears (Figure 3-9).

Figure 3-9   Home Directory Destination Screen
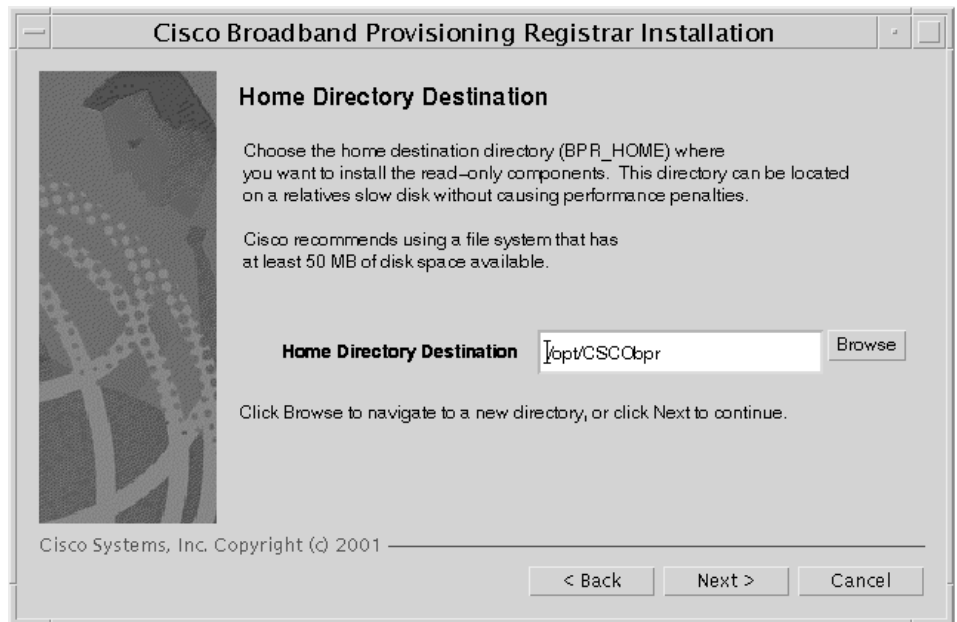
Step 2   Enter the pathname for the home directory, or click the **Browse** button to locate the directory.

Step 3   Click **Next**. The installation program performs some validation and then the Data Directory Destination screen appears (Figure 3-10).

Figure 3-10   Data Directory Destination Screen
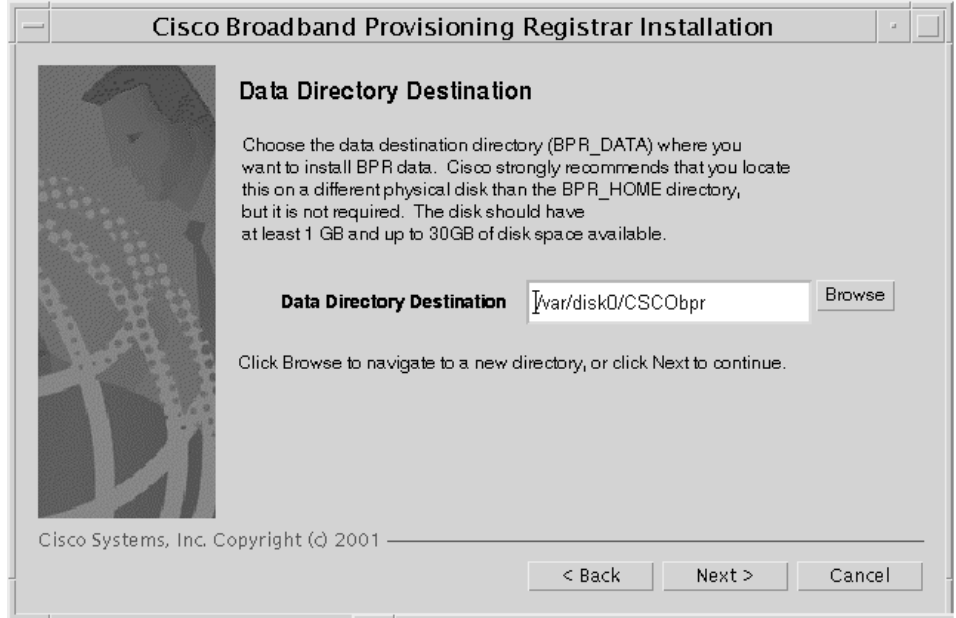
Step 4   Accept the default directory or enter a new directory. You can use the **Browse** button to select a new directory.

> **Note**   By default, the installation program installs the data directory (BPR_DATA) on a different directory than the home directory (BPR_HOME). Cisco Systems recommends that the data directory be on a different physical disk than the home directory; for example, /var/disk0/CSCObpr. However, you can install the data directory on the same disk as the home directory.
>
> The directory specified becomes the top-level directory under which the installation program creates a number of subdirectories; for example, /var/disk0/CSCObpr/rdu/db.

Step 5   Click **Next**. The Regional Distribution Unit Host/Port screen appears (Figure 3-11).

Figure 3-11   Regional Distribution Unit Host/Port Screen
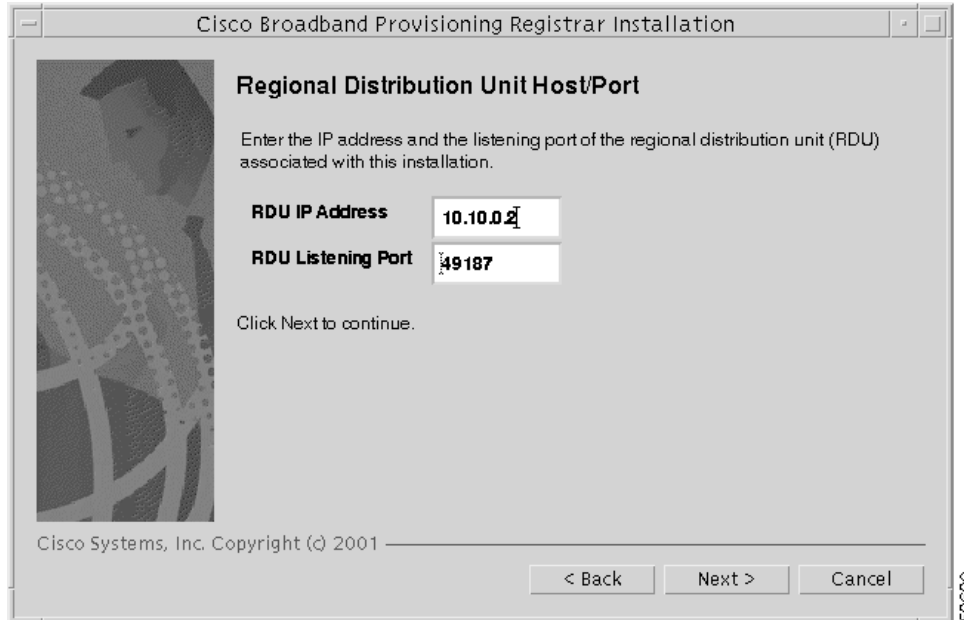
Step 6   Enter the IP address (or hostname) and the listening port of the host where the RDU software is installed. By default, the name of the local host appears in the RDU IP Address field.

Step 7   Click **Next**. The Cisco Network Registrar Extension Point Provisioning Group screen appears (Figure 3-12).

Figure 3-12   Cisco Network Registrar Extension Point Provisioning Group Screen

Step 8   Enter the name of the extension point provisioning group.

Step 9   Click **Next**. The Shared Secret Password screen appears (Figure 3-13).

Figure 3-13   Shared Secret Password Screen

Step 10   Enter and confirm the shared secret password. This password is a token that a BPR server uses to authenticate communication with other BPR servers.

Note   Use the shared secret password specified during the RDU installation.

Step 11   Click **Next**. The Installation Parameters screen appears (Figure 3-14). This screen identifies the values that you have entered in the previous screens. To modify any of the values entered click **Back** until the desired screen appears.

Figure 3-14   Installation Parameters Screen

Step 12   Click **Next**. When the installation is complete, the Installed Components Summary screen appears (Figure 3-15).

Figure 3-15   Installed Components Summary Screen
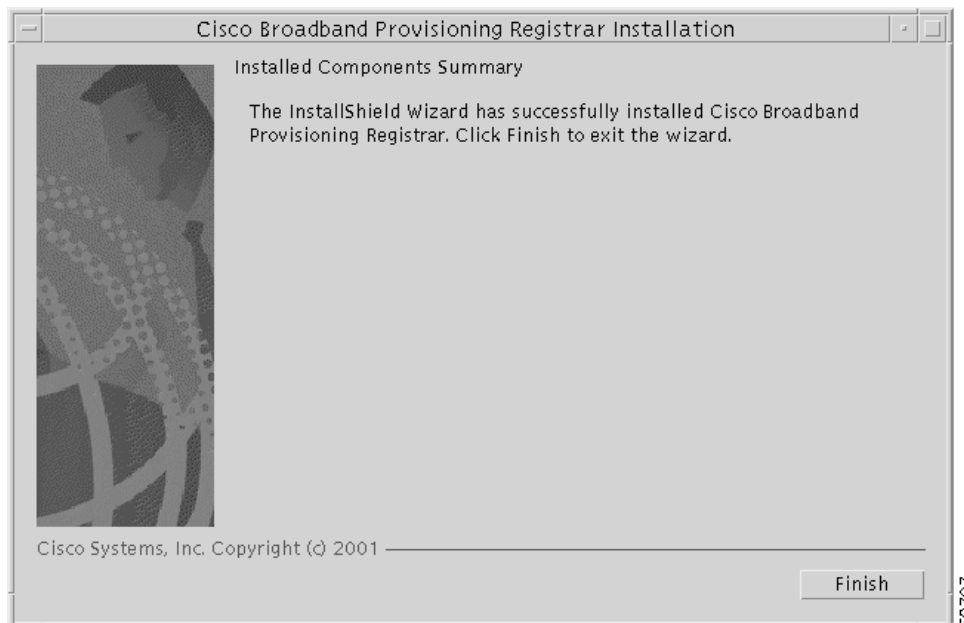
Step 13   To exit the installation program, click **Finish**.

Configuring Extensions

After you install the BPR extensions to Network Registrarr, you must configure the extensions. The procedure described in this section makes these assumptions:

- The BPR component is installed in /opt/CSCObpr
- Network Registrar is installed in /opt/nwreg2
- The Network Registrar username is **admin** and the password is **changeme**.

To configure extensions, follow these steps:

Step 1   Log in as *root* to the Network Registrar server.

Step 2   At the command line, enter the following commands:

```
/opt/nwreg2/usrbin/nrcmd -N admin -P changeme -b <
/opt/CSCObpr/cnr_ep/bin/bpr_cnr_enable_extpts.nrcmd
```

Step 3   Reload the Network Registrar server by entering the following commands:

```
/etc/init.d/aicservagt stop
/etc/init.d/aicservagt start
```

Alternatively, you can enter this command to reload the server:

```
/opt/nwreg2/usrbin/nrcmd -N admin -P changeme "dhcp reload"
```

⚠

Caution   Be aware that you also must configure client-classes, scope selection tags, policies, and scopes before you can use the Network Registrar server. See the *Network Registrar User's Guide* for information about configuring these entities.

✎

Note   BPR starts with the following default unprovisioned client-classes: unprovisioned-docisis (for DOCSIS modems), unprovisioned-computer (for computers), unprovisioned-dstb (for digital set top boxes).

Installing the Application Programming Interface

Install the API component on one or more client devices. Before you install the API, complete the steps described in the "Initial Installation Steps" section on page 2-5. To install the API, follow these steps:

Step 1 On the Install Components screen (Figure 2-3), select the Application programming interface option and click **Next** to continue. The Home Directory Destination screen appears (Figure 3-3).

Figure 3-16   Home Directory Destination Screen
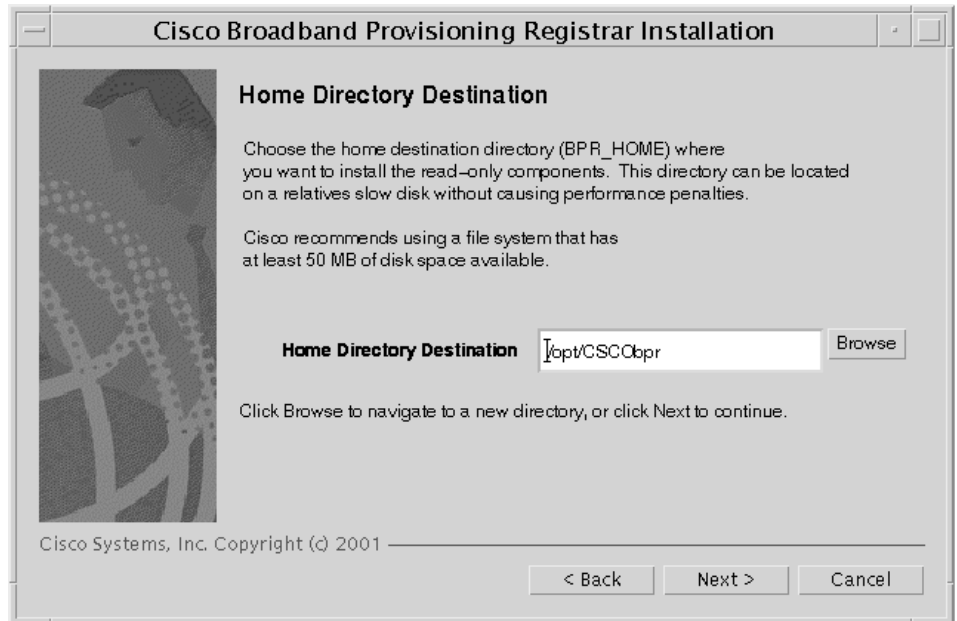
Step 2 Enter the pathname for the home directory, or click the **Browse** button to locate the directory.

Step 3 Click **Next**. The Installation Parameters screen appears (Figure 3-17). This screen identifies the values that you have entered in the previous screens. To modify any of the values entered, click **Back** until the desired screen appears.

Figure 3-17   Installation Parameters Screen

Step 4   Click **Next**. When the installation is complete, the Installed Components Summary screen appears (Figure 3-18).

Figure 3-18   Installed Components Summary Screen
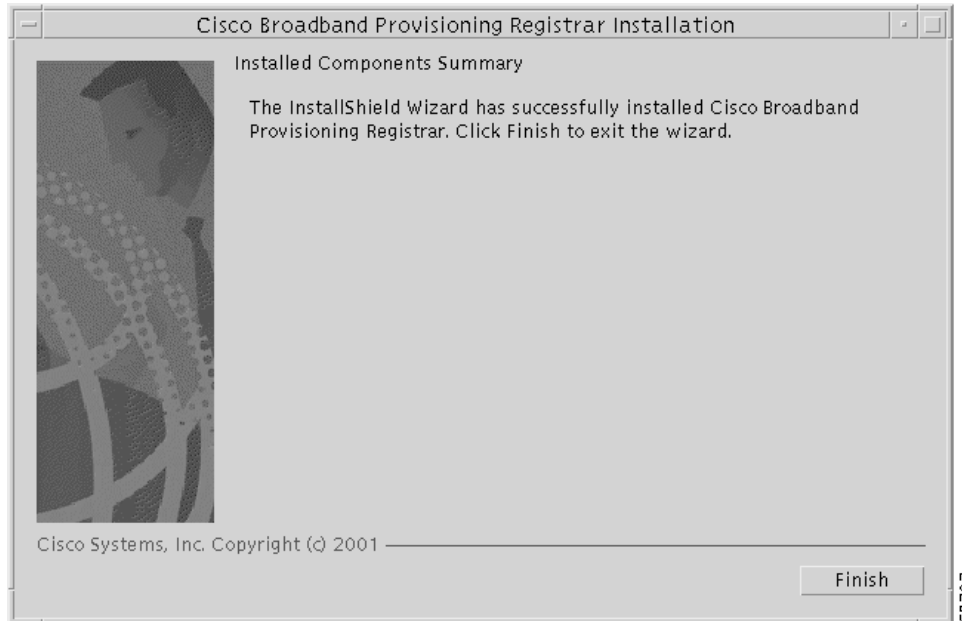
Step 5   To exit the installation program, click **Finish**.

Installing Components Using the CLI

This section explains the procedures that you follow to install one or more of components of BPR using the CLI.

You can choose to install one or all of these components:

- Regional distribution unit
- Network Registrar extensions
- Application programming interface (API)

For more information about each component see the "Broadband Provisioning Registrar Components" section on page 2-1.

Before you begin any of these procedures, you must complete the initial installation procedure. For more information, see the "Installing from the Command Line" section on page 2-7.

Installing the Regional Distribution Unit

To install an RDU, complete the steps described in the "Installing from the Command Line" section on page 2-7. Then, follow these steps:

Step 1 When the installation program prompts you to select one or more components, enter **y** and press **Enter** at Regional Distribution Unit (RDU) (y/n/?). The program then asks if you want to install Cisco Network Registrar extension points and the application programming interface.

Step 2 To skip installing the extension points and the API, press **n** and **Enter** for each option.

For example:

```
Installation Components


Select one or more components to install BPR.

   Regional distribution unit (RDU) (y/n/?) [no] y
   Cisco Network Registrar extension points (y/n/?) [no] n
   Application provisioning interface (API) client (y/n/?) [no] n
```

The program prompts you to confirm the components that you want to install.

Step 3 Press **y** and **Enter** to continue. The program prompts you to start individual component validation.

Step 4 Press **Enter** to continue. For example:

```
Starting the individual component installation parameters validation.


   Press Enter to Continue or 'q' to Quit:
Validating the individual component installation parameters - Please wait.
```

The program prompts you to enter your BPR license key.

Step 5   Enter your license key. The program confirms the license key and then prompts you to enter another license key. For example:

```
BPR License Key(s)


Enter the license key information to validate your license.

   Enter Key [] ASf-tU-A$R$R-hyw9-sRRRR---N9D6MPXwM



========= Confirmation =========
Do you want to enter another License Key

   Is this correct (y/n/q/?)   [yes] yes
```

Step 6   To add another license key, press **y** and **Enter**; to proceed to the next step, press **n** and **Enter**. The program prompts you to enter the home directory destination.

Step 7   To accept the default directory, /opt/CSCObpr, press **Enter**; or enter another directory. For example:

```
Home Directory Destination

   Home Directory Destination [/opt/CSCObpr]
```

The program asks you to confirm the directory.

Step 8   Press **y** and **Enter** to continue. The program prompts you to enter the data directory destination.

Step 9   To accept the default directory, /var/CSCObpr, press **Enter**; or enter another directory. For example:

```
Data Directory Destination

   Data Directory Destination [/var/CSCObpr]/var/disk0/CSCObpr
```

The program then asks you to confirm the directory.

> ✎
>
> **Note**   By default, the installation program installs the data directory (BPR_DATA) on a different directory than the home directory (BPR_HOME). Cisco Systems recommends that the data directory be on a different physical disk than the home directory; for example, /var/disko/CSCObpr. However, you can install the data directory on the same disk as the home directory.
>
> The directory specified becomes the top-level directory under which the installation program creates a number of subdirectories; for example, /var/disk0/CSCObpr/rdu/db.

Step 10   Press **y** and **Enter** to continue. The program prompts you to enter the database transaction logs destination.

Step 11   To accept the default directory, /var/CSCObpr, press **Enter**; or enter another directory. For example:

```
Database Transaction Logs Destination


Logs Directory Destination

   Logs Directory Destination [/var/CSCObpr] /var/disk1/CSCObpr
```

The program then asks you to confirm the directory.

✎
Note   By default, the installation program installs the database transaction logs directory (BPR_DBLOG) in the same directory as the data directory (BPR_DATA). Cisco Systems recommends that you locate the database transaction logs directory on the fastest disk on the system and that you ensure that the disk has 1 GB of space available.

The directory specified becomes the top-level directory under which the installation program creates a number of subdirectories.

Step 12   Press **y** and **Enter** to continue. The program prompts you to enter the listening port for the RDU.

Step 13   To accept the default value, 49187, press **Enter**; or enter another port number. For example:

```
Regional Distribution Unit Host/Port


Enter the IP address and the listening port of the regional distribution unit
(RDU)
associated with this installation.


Enter  the Host/IP address and address of the listening port for the RDU and

   RDU Listening Port [49187]
```

✎
Note   The installation program obtains the IP address of the RDU automatically. You do not need to enter this value.

The program then prompts you to confirm the listening port number.

Step 14   Press **y** and **Enter** to continue. The program prompts you to enter the shared secret password. This password is token that a BPR server uses to authenticate communication with other BPR servers.

✎
Note   You must use the same shared secret password for all BPR servers on your network. The default password is **secret**.

Step 15   Enter the password that you want to use for authentication among BPR servers. For example:

```
Shared Secret Password


Enter the password to be used for authentication
among the BPR servers.


If you are performing a lab installation, then the password will be used for
all the servers.  If this is a component installation, then the password you
enter must be the same as the components previously installed.

   Enter the Shared Secret Password [secret] secret
```

The program prompts you to confirm the password.

Step 16   Enter the password again and press **y** to continue. The program displays the installation parameters you have selected. For example:

```
The Component Installation will use the following parameters
to install the RDU component:
```

```
Home directory:/opt/CSCObpr
Data directory:/var/disk0/CSCObpr
Logs directory:/var/disk1/CSCObpr
RDU Port:49187
```

Step 17   Press **y** to install the RDU component. The program displays a message when the installation is complete.

Installing Network Registrar Extensions

Before you install Network Registrar extensions, complete the steps described in the "Installing from the Command Line" section on page 2-7. To install the extensions, follow these steps:

Step 1   When the installation program prompts you to select one or more components, press **y** and **Enter** at Cisco Network Registrar extension points (y/n/?).

To skip installing an RDU and the API, press **n** and **Enter** for these options.

For example:

```
Installation Components


Select one or more components to install BPR.

    Regional distribution unit (RDU) (y/n/?) [no] n
    Cisco Network Registrar extension points (y/n/?) [no] y
    Application provisioning interface (API) client (y/n/?) [no] n
```

The program prompts you to confirm the components that you want to install.

Step 2   Press **y** and **Enter** to continue. The program displays a message that it is starting individual component validation.

Step 3   Press **Enter** to continue. For example:

```
Starting the individual component installation parameters validation.


    Press Enter to Continue or 'q' to Quit:
Validating the individual component installation parameters - Please wait.
```

The program prompts you to enter the home directory destination,

Step 4   To accept the default home directory destination, /opt/CSCObpr/, press **Enter**; or enter another directory. For example:

```
Home Directory Destination

    Home Directory Destination [/opt/CSCObpr]
```

The program then asks you to confirm the directory.

Step 5   Press **y** and **Enter** to continue. The program prompts you to enter the data directory destination

Step 6   To accept the default directory, /var/CSCObpr, press **Enter**; or enter another directory. For example:

```
Data Directory Destination

    Data Directory Destination [/var/CSCObpr] /var/disk0/CSCObpr
```

> ✎
>
> **Note**   By default, the installation program installs the data directory (BPR_DATA) on a different
> directory than the home directory (BPR_HOME). Cisco Systems recommends that the data
> directory be on a different physical disk than the home directory; for example
> /var/disk0/CSCObpr. However, you can install the data directory on the same disk as the
> home directory.
>
> The directory specified becomes the top-level directory under which the installation program
> creates a number of subdirectories; for example, /var/disk0/CSCObpr/rdu/db.

Step 7   Press **y** and **Enter** to continue. The program prompts you to enter the host IP address and the listening
port of the RDU.

Step 8   Enter the IP address (or hostname) and listening port of the host where the RDU software is installed.
The program prompts you to confirm this information. For example:

```
Regional Distribution Unit Host/Port


Enter the IP address and the listening port of the regional distribution unit
(RDU)
associated with this installation.


Enter the Host/IP address and address of the listening port for the RDU.

   RDU IP Address [doc-u5.cisco.com] 10.10.10.2
   RDU Listening Port [49187]



========== Confirmation ==========
RDU Host:10.10.10.2
RDU Port:49187


   Is this correct (y/n/q/?)  [yes] y
```

Step 9   Press **y** and **Enter** to continue. The program prompts you to enter the name of the extension point
provisioning group.

Step 10   Enter the name of the Network Registrar extension point group. For example:

```
Cisco Network Registrar Extension Point Provisioning Group


Enter the Cisco Network Registrar extension point provisioning group.


This a required field.  The value you specify must contain only  alphanumeric
characters without spaces and not exceed 10 characters in length.  You can use
the BPR command-line tool to change this value after you complete this
installation.

    Extension Point Provisioning Group [] group1
```

Step 11   Press **y** and **Enter** to continue. The program prompts you to enter the shared secret password. This
password is token that a BPR server uses to authenticate communication with other BPR servers.

> **Note** You must use the same shared secret password for all BPR servers on your network.

Step 12 Enter the password that you want to use for authentication among BPR servers. For example:

```
Shared Secret Password


Enter the password to be used for authentication
among the BPR servers.


If you are performing a lab installation, then the password will be used for
all the servers.  If this is a component installation, then the password you
enter must be the same as the components previously installed.

   Enter the Shared Secret Password [secret] changeme
```

The program prompts you to confirm the password.

Step 13 Enter the password again.

Step 14 Press **y** and **Enter** to continue. The program then displays the installation parameters you have selected. For example:

```
Installation Parameters


This screen shows the installation parameters that you have chosen:



========= Confirmation =========
The Component Installation will use the following parameters
to install the NR Extension Points component:

Home directory:/opt/CSCObpr
Data directory:/var/disk0/CSCObpr
NR extension point provisioning group:group1
```

Step 15 Press **y** and **Enter** to install the Network Registrar extensions. The program displays a message when the installation is complete.

Step 16 Configure the extensions by following the procedure described in the "Configuring Extensions" section on page 3-13.

Installing the Application Programming Interface

Before you install the application programming interface (API), complete the steps described in the "Installing from the Command Line" section on page 2-7. To install the API, follow these steps:

Step 1   When the installation program prompts you to select one or more components, press **y** and **Enter** at Cisco Network Registrar extension points (y/n/?).

To skip installing an RDU and Network Registrar extension points, enter **n** and **Enter** for these options.

For example:

```
Installation Components


Select one or more components to install BPR.

   Regional distribution unit (RDU) (y/n/?) [no] n
   Cisco Network Registrar extension points (y/n/?) [no] n
   Application provisioning interface (API) client (y/n/?) [no] y
```

The program prompts you to confirm the components that you want to install.

Step 2   Press **y** and **Enter** to continue. The program displays a message that it is starting individual component validation.

Step 3   Press **Enter** to continue. For example:

```
Starting the individual component installation parameters validation.


   Press Enter to Continue or 'q' to Quit:
Validating the individual component installation parameters - Please wait.
```

The program prompts you to enter the home directory destination.

Step 4   To accept the default home directory destination, /opt/CSCObpr/, press **Enter**, or enter another directory. For example:

```
Home Directory Destination

   Home Directory Destination [/opt/CSCObpr]
```

The program then asks you to confirm the directory.

Step 5   Press **y** and **Enter** to continue. The program displays the installation parameters that you selected. For example:

```
Installation Parameters


This screen shows the installation parameters that you have chosen:



========== Confirmation ==========
The Component Installation will use the following parameters
to install the  component:

Home directory:/opt/CSCObpr
```

Step 6   Press **y** and **Enter** to install the API. The program displays a message when the installation is complete.

Configuring the Syslog to Receive Alerts from BPR

This section describes how to configure the syslog on a Network Registrar server to receive alerts and debugging information from BPR.

Step 1   Log in as *root* on the Network Registrar server.

Step 2   At the command line, create the log file. For example:

```
touch /var/log/bpr.log
```

Step 3   Open the /etc/syslog.conf file with a text editor.

Step 4   Adding the following line to the /etc/syslog.conf file:

```
local6.info          /var/log/bpr.log
```

✎
Note   You must insert one or more tabs between local6:info and /var/log/bpr.log

Step 5   Save and close the /etc/syslog.conf file.

Step 6   To force syslog to take the new configuration, at the command line enter these commands:

```
ps -ef | grep syslogd
    root   217    1  0   Nov 26 ?          0:00 /usr/sbin/syslogd

kill -HUP 217
```

Network Registrar is now ready to receive alerts from BPR.

Uninstalling Broadband Provisioning Registrar

The program described in this section uninstalls the RDU, Network Registrar extensions, and the API, but it does not uninstall the Network Registrar application. Prior to removing BPR you have to manually unconfigure Network Registrar.

The uninstallation program removes all files located under the installation directory (the default installation directory is /opt/CSCObpr).   If the database is found under the installation directory, as is the case in the lab installation program, the program displays a warning message that it is deleting the database. You can exit from the uninstallation program at that time, or you can choose to proceed.

The uninstallation program also shuts down and removes the following processes if they are detected: RDU Agent and JRun.

The uninstallation program does *not* remove files that were placed outside the installation directory. For example, a component installation places the database and database transaction logs directories under /var/CSCObpr. So theses files are not removed. The uninstallation program also does *not* remove any files that are located under the Network Registrar directory.

⚠

Caution   If you uninstall BPR after configuring your Network Registrar servers to use BPR extensions, your network will no longer function correctly. You must uninstall BPR client-classes and client-class extensions in Network Registrar to completely uninstall the BPR program.

To uninstall BPR, follow these instructions:

Step 1   Log in as *root*.

Step 2   Manually unconfigure the BPR extensions on the Network Registrar server. You can unconfigure Network Registrar from any server that has **nrcmd** installed and connectivity with Network Registrar. Follow these steps:

✎

Note   This procedure assumes the default installation directories for BPR and Network Registrar. It also uses the default Network Registrar username and password. If you installed these products in other directories, you should enter those directory names instead,

a.   To uninstall the BPR extensions from your Network Registrar configuration, use the following commands:

```
/opt/nwreg2/usrbin/nrcmd -N admin -P changeme -b <
/opt/CSCObpr/cnr_ep/bin/bpr_cnr_disable_extpts.nrcmd
```

b.   To reload your DHCP server, use the following commands:

```
/etc/init.d/aicservagt stop
/etc/init.d/aicservagt start
```

Alternatively, enter this command:

```
/opt/nwreg2/usrbin/nrcmd -N admin -P changeme "dhcp reload"
```

c.   To remove the BPR extensions from the Network Registrar extensions directory, use the following command:

```
rm -f /opt/nwreg2/extensions/dhcp/dex/libbprextensions.so
```

Step 3   At the CLI prompt, enter:

```
/opt/CSCObpr/_uninst/uninstall.bin
```

The uninstallation program's Welcome screen appears (Figure 3-19).

Figure 3-19   Broadband Provisioning Registrar Uninstallation Screen
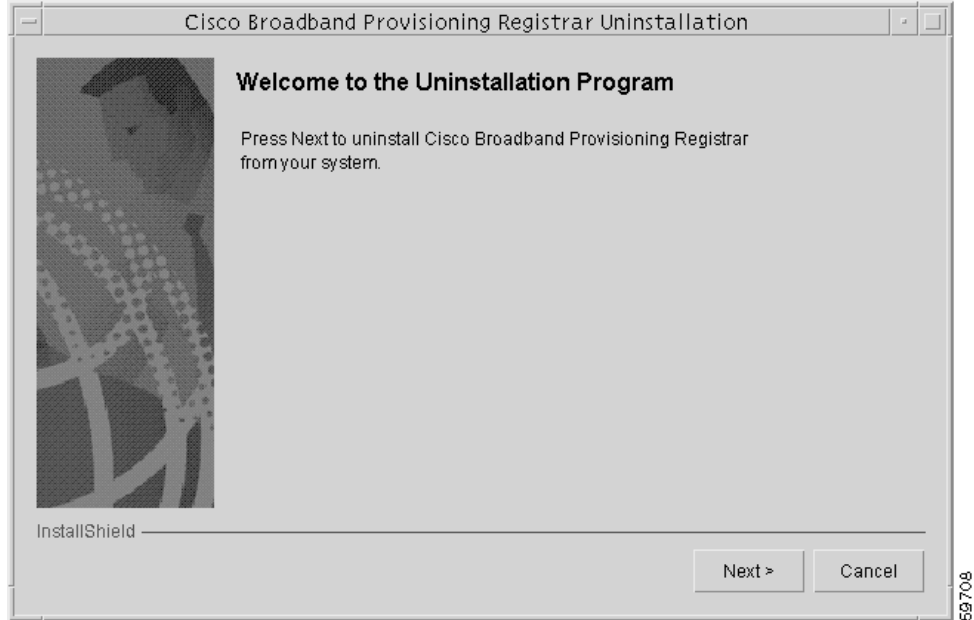
Step 4   Click **Next**. The uninstallation program begins removing BPR files (Figure 3-20).

Figure 3-20   Uninstall Screen
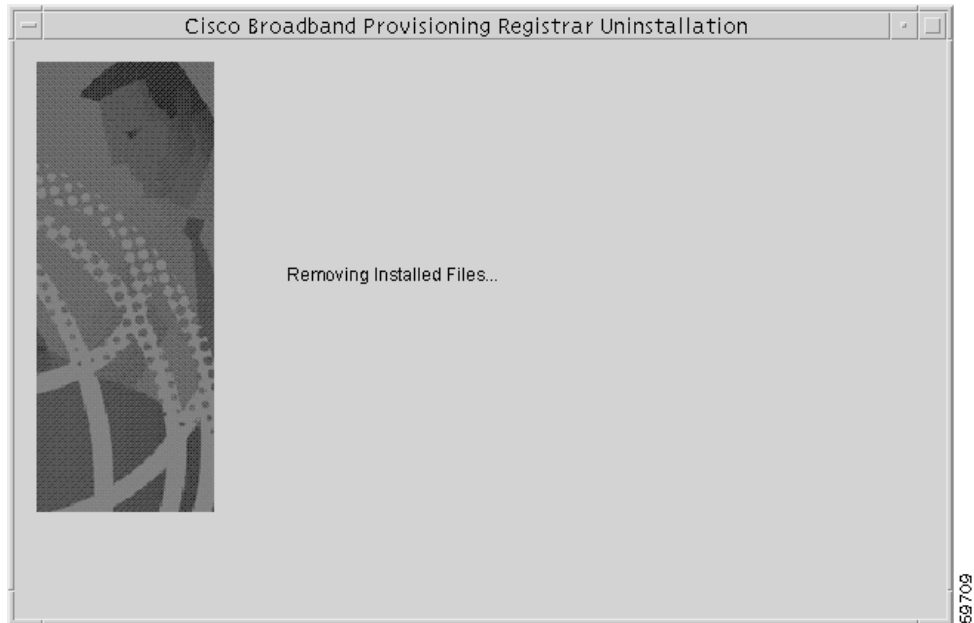
When the uninstallation is complete, the Cisco Broadband Provisioning Registrar was Uninstalled screen appears (Figure 3-21).

Figure 3-21   Cisco Broadband Provisioning Registrar Was Uninstalled Screen
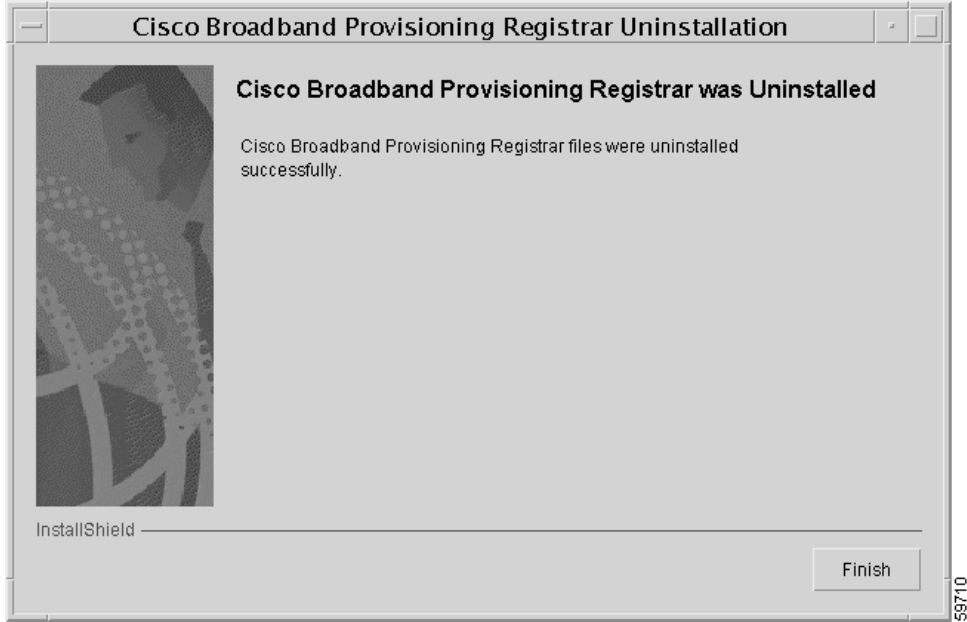
Step 5 To exit the uninstallation program, click **Finish**.

CHAPTER

4

Installing In a Lab Environment

When you install BPR in a lab environment, the installation program installs all components on a single server. The lab installation program involves fewer steps than the component installation and automates much of the configuration. When you complete the installation, however, you need to perform some setup on a cable modem termination system (CMTS) and on Network Registrar.

The lab installation program is designed to keep the installation and configuration as simple as possible by using a predefined overall system configuration. This enables you to quickly set up BPR for basic evaluation purposes.

The lab installation program uses predefined default values for the installation that assume a specific network configuration. This configuration creates scopes, policies, client classes, and selection tags.

This chapter describes how to install Broadband Provisioning Registrar (BPR) in a lab environment or to demonstrate product functionality and how to configure a CMTS and Network Registrar to support BPR.

Installation Checklist

You can install BPR in a lab environment on a single computer running the Solaris 8 operating system. Before you run the installation program, use the following checklist to ensure that you are ready:

- Verify the prerequisite system hardware and software requirements described in Chapter 1, "Overview."

- Have your BPR evaluation license key or keys at hand. You need a valid license key for each technology that you want to provision with BPR.

- Ensure that you have *root* access to the computers where you intend to install BPR.

- Verify that Network Registrar 5.0.9 or greater is installed on the server.

- Determine the destination directory in which you want to install BPR.

    Note Cisco Systems recommends that you have at least 50 MB of disk space available.

- For the RDU, select the shared secret password that BPR servers on your network use as a token to authenticate communication with one another. The shared secret password is the same for all BPR servers on your network.

- For extensions, determine the name of provisioning group to which the Network Registrar server belongs.

 • Verify that you have the necessary Network Registrar configuration files, (See Appendix A, "Network Registrar Configuration File Example" for an example of these configuration files.)

Installing in a Lab Environment Using the GUI

The lab installation prompts for the following information:

 • BPR destination directory
 • Network Registrar administrator username and password
 • Shared secret password

During a lab installation, a set of predetermined default values are used as a network configuration.

To install BPR in a lab environment, follow these steps:

Step 1 Complete steps 1 through 4 in the "Installing from the Graphical User Interface" section on page 2-5.

Step 2 Click **Lab** when the Choose Installation Type screen appears (Figure 4-1).

Figure 4-1   Choose Installation Type Screen
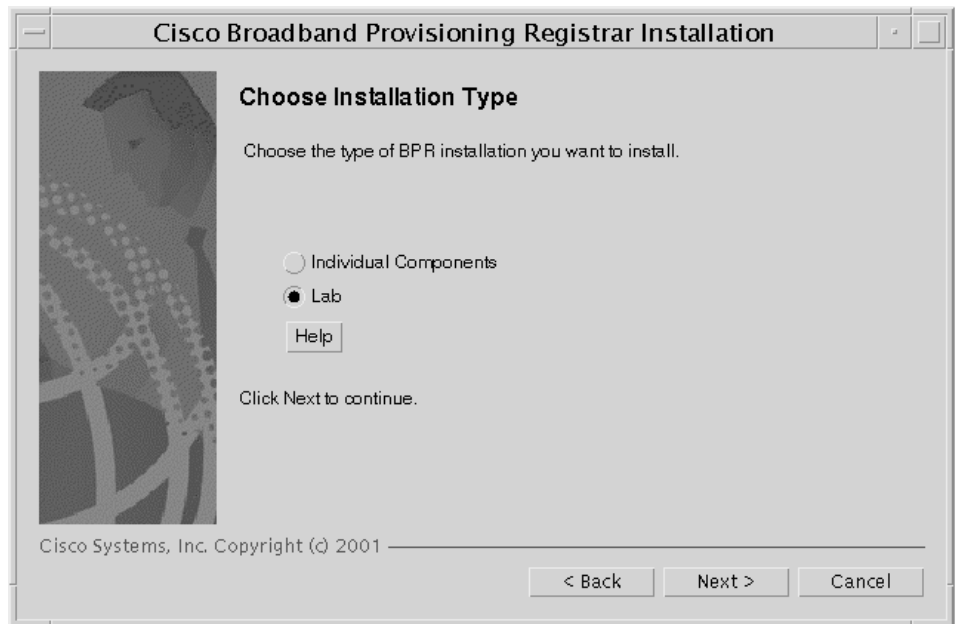
Step 3 Click **Next**. The lab installation program automatically checks to see if it detects a TFTP server. If the Solaris TFTP server is detected, an error message appears and the installation process ends.

> ⚠️
> **Caution**   When installing BPR on a Solaris server, the Solaris TFTP server must be disabled before starting Network Registrar TFTP servers.

Provided that a TFTP server is not detected, the BPR License Key(s) screen appears (Figure 4-2).

Figure 4-2   BPR License Key(s) Screen

Step 4   Enter your evaluation license key and click **Add License Key**. The installation program adds the key that you enter to the list of valid keys. If your BPR deployment supports multiple technologies, you need a key for each technology.

Note   If one of the license keys is incorrect an Invalid License Key dialog appears.

Step 5   Click **Next**. The Destination Directory screen appears (Figure 4-3).

Figure 4-3   Destination Directory Screen

Step 6   Enter the pathname of the location where you want to install BPR.

Step 7   Click **Next**. The installation program confirms that the required disk space is available, and then displays the Network Registrar Username and Password screen (Figure 4-4).

Figure 4-4   Network Registrar Username and Password Screen

Step 8   Enter the Network Registrar administrative username and password.

Step 9   Click **Next**. The Shared Secret Password screen appears (Figure 4-5).

Figure 4-5   Shared Secret Password Screen

Step 10 Enter and confirm the shared secret password. This password is a token that a BPR server uses to authenticate communication with other BPR servers.

Step 11 Click **Next**. The Lab Installation Parameters screen appears (Figure 4-6). This screen identifies the values that you have entered in the previous screens. To modify any of the values entered:

   a. Click **Back** until the desired screen appears.

   b. Make the necessary changes.

   c. Click **Next** repeatedly until you return to this screen.

Figure 4-6   Lab Installation Parameters Screen

Step 12 Click **Next** and the lab version of BPR is installed.

Installing in a Lab Environment Using the CLI

The lab installation prompts for the following information:

- BPR destination directory
- Network Registrar administrator username and password
- Shared secret password

To install BPR in a lab environment, complete the steps described in "Installing from the Command Line" section on page 2-7. Then, do the following:

Step 1 When the installation program prompts you to enter your BPR license key, enter your license key. The program confirms the license key.

The program then prompts you to enter another license key.

Step 2   To add another license key, press **y** and **Enter**; to proceed to the next step, press **n** and **Enter**. The program displays the following message.

```
Validating LAB settings...
```

The program then prompts you to enter the destination directory.

Step 3   To accept the default directory, /opt/CSCObpr, press **Enter**. For example:

```
Destination Directory


Directory path for BPR_HOME


Location BPR_HOME

   Installation Directory [/opt/CSCObpr]
```

The program then asks you to confirm the directory.

Step 4   Press **y** and **Enter** to continue. The program prompts you to enter the Cisco Network Registrar username and password.

Step 5   To enter a Network Registrar username and password, do the following:

  a.   Enter a valid administrator username and password.

  b.   Enter the password again to confirm it.

For example:

```
Cisco Network Registrar Username and Password


Enter the administrator username and password for the NR server.


Enter the username and password for the NR server to be used in the lab
installation.  You must confirm the NR password.

   Network Registrar adminstrator Username [admin] admin
   Network Registrar adminstrator Password [] changeme
   Confirm Network Registrar Password [] changeme
```

The program then redisplays the administrator username, password, and password confirmation. It then prompts you to confirm this information.

Step 6   Press **y** and **Enter** to continue. The program prompts you to enter the shared secret password. This password is a token that a BPR server uses to authenticate communication with other BPR servers. The default password is **secret**.

Step 7   Enter the password that you want to use for authentication among BPR servers. For example:

```
Shared Secret Password


Enter the password to be used for authentication
among the BPR servers.


If you are performing a lab installation, then the password will be used for
all the servers.  If this is a component installation, then the password you
enter must be the same as the components previously installed.

    Enter the Shared Secret Password [secret] secret
```

The program prompts you to confirm the password.

Step 8   Enter the password again and press **y** to continue. The program then displays the installation parameters that you selected. For example:

```
Installation Parameters


This screen shows the installation parameters that you have chosen:




========== Confirmation ==========
The Lab/Demo Installation will install all components using the following
parameters:

Installation directory:/opt/CSCObpr

    Is this correct (y/n/q/?)  [yes]
```

Step 9   Press **y** and **Enter** to install the lab software. The program displays a message when the installation is complete.

Configuring Network Registrar and a CMTS

For BPR to function in a lab environment you need to set up Network Registrar client-classes, policies, scopes, and selection tags. You also need to perform some configuration of CMTS devices.

To configure Network Registrar and CMTS devices, follow these steps:

Step 1   Set up scopes on your Network Registrar server. The following command shows an example of setting up scopes:

```
/opt/nwreg2/usrbin/nrcmd  -N <USER_NAME> -P <PASSWORD> -b  <
/opt/CSCObpr/cnr_ep/samples/bpr_cnr_hsd_sample_config.nrcmd > cnr_setup.out.
```

> ✎
> **Note** The **/opt/CSCObpr/cnr_ep/samples/bpr_cnr_hsd_sample_config.nrcmd** command runs
> a sample Network Registrar configuration script, which defines client-classes, policies,
> scopes, selection tags and other related information. You might want to update this file to
> reflect the IP address settings on your network. For more information about this file, see
> Appendix A, "Network Registrar Configuration File Example." For more detailed
> information about defining client-classes, policies, scopes, and selection tags, see the
> *Network Registrar User's Guide*.

Step 2 Enable the cable interface or interfaces on your CMTS with the correct IP addresses and DHCP
helper-address. For example, in the case of the Network Registrar script, provided in the previous step,
you might edit the CMTS configuration as follows:

```
interface Cable3/0
    ip address 172.27.192.17 255.255.255.240 secondary
    ip address 172.27.192.33 255.255.255.240 secondary
    ip address 172.27.192.49 255.255.255.240 secondary
    ip address 172.27.192.1 255.255.255.240
    no ip directed-broadcast
    no keepalive
    cable downstream annex B
    cable downstream modulation 64qam
    cable downstream interleave-depth 32
    cable downstream frequency 477000000
    cable upstream 0 frequency 26000000
    cable upstream 0 power-level 0
    no cable upstream 0 shutdown
    cable dhcp-giaddr primary
    cable helper-address <IP Address Of Your Network Registrar Server>
```

Step 3 To configure your CMTS to insert the DHCP relay agent information option in forwarded
BOOTREQUEST messages, use the following Cisco IOS command:
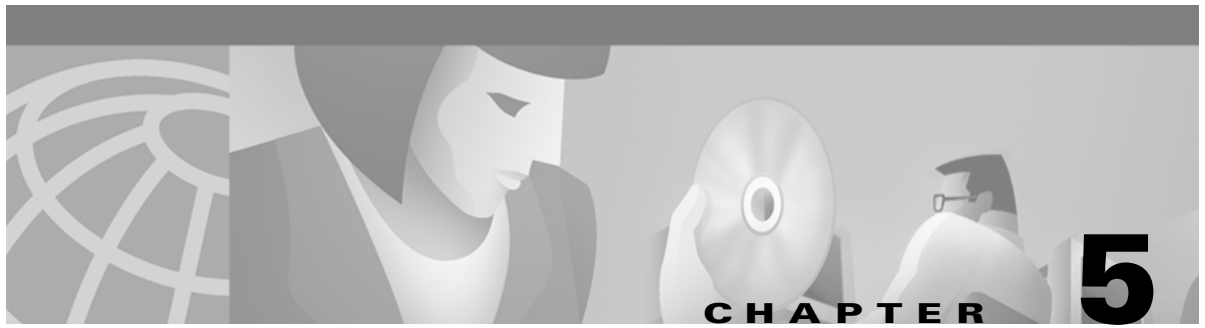
```
ip dhcp relay information option
```

The default device detection logic in BPR uses DHCP option 82 information (relay-agent information)
to detect devices.

Step 4 To configure your CMTS so that it does *not* validate the relay agent information option in forwarded
BOOTREPLY messages, use the following IOS command.

```
no ip dhcp relay information check
```

Setting Up a Cisco Device Provisioning Engine

A Cisco Device Provisioning Engine caches provisioning information and handles all configuration requests including downloading configuration files to devices. It is integrated with the Cisco Network Registrar DHCP server to control the assignment of IP addresses. Multiple DPEs can communicate with a single DHCP server. DPEs come with factory installed software that enables provisioning, but you must perform some initial configuration.

You need to set up at least one DPE for every 250,000 devices on your network. This chapter describes the set up procedure.

Order of Operations

Follow the order of operations described in Table 5-1 to set up a DPE.

Table 5-1   Order of Operations

Item	Description
1.	Connect the DPE to the serial port of a computer.
2.	Configure and run a terminal emulation program on the computer.
3.	Log in to the DPE and change the login/enable password.
4.	Configure the DPE.
5.	Reload the DPE.

Connecting the DPE

Each DPE comes with a console cable. To begin setting up the DPE, complete the following steps:

Step 1   Attach one end of the cable to the console port of the DPE.

Step 2   Attach the other end of the cable to the serial port on the computer that you want to use to configure the DPE.

Step 3   Proceed to the "Configuring and Running a Terminal Emulation Program" section on page 5-2.

Configuring and Running a Terminal Emulation Program

You must configure and then run a terminal emulation program on the computer that you have connected to the DPE.

To configure and run a terminal emulation program, complete the following steps at the console of the computer:

Step 1   Log in to the computer as *root*.

At the command line, enter the name of a terminal emulator. Choose a terminal emulation program that enables communication with the DPE through the serial port on the host computer.

Step 2   Configure the terminal emulator as follows:

- Speed:9600
- Data Bits:8
- Parity:None
- Stop Bits:1
- Flow Control:Hardware

When you have correctly configured the terminal emulation program, you are prompted to log in to the DPE.

Step 3   Proceed to the "Logging In" section on page 5-3.

Logging In

To login to the DPE, complete the following steps:

Step 1   At the password prompt, enter the login password. The default user and enable passwords are changeme. For example:

```
localhost BPR Device Provisioning Engine

User Access Verification

Password:
```

> ✎
>
> **Note**   For security reasons, Cisco Systems strongly recommends that you change this password.

The system displays the following user mode prompt:

```
localhost>
```

Step 2   Run the **enable** command to enter privileged mode. You must be working in privileged mode to configure the DPE. For example:

```
localhost> enable
```

The system prompts you for the enable password.

Step 3   At the prompt, enter the enable password. The default is changeme.

The system displays the following privileged mode prompt:

```
localhost#
```

Step 4   To change the login and enable password, as Cisco Systems recommends, do the following:

  a.   At the localhost# prompt, enter the **password** command. For example:

```
localhost# password
```

   The system prompts you for the new password.

  b.   Enter the new password. The system prompts you to enter the new password again.

  c.   Re-enter the new password. The system displays a message that you successfully changed the password.

Remember that this is your new log in password. If you want to change the privileged mode password, use the **enable password** command.

Step 5   Proceed to the .

Configuring a Device Provisioning Engine

To configure a DPE, have the following information available:

- The static IP address that you want to assign to the DPE

- The IP address or fully qualified domain name of the RDU for the DPE

- The provisioning group or groups of which the DPE is part

- The IP address of the default gateway on your network, if the default gateway is implemented on your network

- The hostname of the DPE

To configure a DPE, complete the following steps:

Step 1   Assign a static IP address and subnet mask to the first ethernet port on the DPE. For example, to assign IP address 192.168.0.10 and the subnet mask 255.255.255.0, enter the following commands:

```
localhost# interface ethernet 0 ip address 192.168.0.1 255.255.255.0
localhost# interface ethernet 0 ip enabled true
localhost# interface ethernet 0 provisioning enabled true
```

> **Note**   The values provided here are sample values only. Use values appropriate for your network.

Step 2   Enter the IP address for the RDU or its domain name if you are implementing DNS. Also, identify the port on which the RUD is listening. The default listening port is 49187. For example:

```
localhost# dpe rdu-server 192.168.0.5 49187
```

Step 3   Specify the provisioning group or groups of which the DPE is part. Where appropriate, specify the secondary provisioning group of which it is part. For example:

```
localhost# dpe provisioning-group primary group1
localhost# dpe provisioning-group secondary group2
```

Step 4   If your network topology has a default gateway IP address, enter that information. For example:

```
localhost# ip default-gateway 192.168.0.128
```

Step 5   To set up DNS for the DPE, enter the IP address of the DNS server. For example:

```
localhost# ip name-server 192.168.0.2
```

> **Note**   To enter more than one DNS server name, lists the servers with a space between each entry.

Step 6   Provide the DNS hostname and domain name for the DPE. For example:

```
localhost# hostname DPE1
localhost# ip domain-name example.com
```

Step 7   Configure the current time on the DPE. For example:

```
localhost# clock set 23:59:59 20 12 2001
```

Step 8   Set the shared secret password to be the same as that on the RDU. The default shared secret password is **secret**. For example:
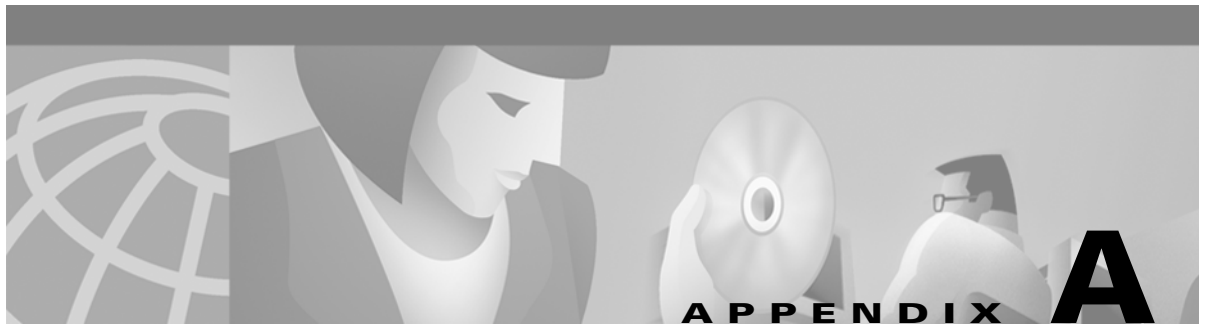
```
localhost# dpe shared-secret secret
```

Step 9   For the configuration to take effect, you must reload the DPE. For example:

```
localhost# reload
```

After you reload the DPE, you can establish a Telnet session using the IP address of the DPE. Remember to use the new login and enable password that you created in the "Logging In" section on page 5-3.

Network Registrar Configuration File Example

This appendix describes the configuration file example included with this installation. This file is typical of the files you use during the BPR installation.

Configuration Script

This section describes the sample configuration script that you can copy and use to work with your BPR implementation.

This sample configuration **nrcmd** script (**bpr_cnr_hsd_sample_config.nrcmd**) is used for a high-speed data deployment of DOCSIS modems and computers, in a multiple host configuration with failover protection. It is installed in this directory: /opt/CSCObpr/cnr_ep/samples/.

These assumptions have been made to create this script:

- DHCP primary server IP address is: 10.20.10.1
- DHCP backup server IP address is: 10.20.10.3
- TFTP primary server IP address is: 10.20.10.5
- TFTP backup server IP address is: 10.20.10.7
- DNS server IP address is: 10.20.10.9
- LDAP server IP address is: 10.20.10.11
- ToD server IP address is: 10.20.10.13

This sample script defines these objects:

- Scope selection tag objects for provisioned client classes.
- Client class objects for provisioned DOCSIS modems, and computers.
- Policy objects for unprovisioned and provisioned devices. The only difference is that DNS servers are not given to unprovisioned devices.
- Scope and scope policy objects for unprovisioned and provisioned DOCSIS modems, and Computers. The scope object option selection tags must include the provcpetagUnProvisioned* tags defined by BPR.
- Enable TFTP to start on reload.

The sample script also enables DHCP failover. To set up failover, a version of this script is applied to the primary and backup DHCP servers. This script is intended for the primary DHCP server. The only change needed on the backup server is to reference the backup TFTP server.

To run this script, enter:

```
nrcmd> -b -N admin -P changeme < csrc_cnr_hsd_sample_config.nrcmd
```