



## **Installation and Setup Guide for Cisco Broadband Access Center**

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## Preface

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The *Installation and Setup Guide for Cisco Broadband Access Center 4.0* describes general requirements and installation procedures for Cisco Broadband Access Center, which is called BAC throughout this guide.

This preface provides an outline of the other chapters in this guide, details information about related documents that support this BAC release, and demonstrates the styles and conventions used in the guide.

This preface contains the following sections:

- [Document Revision History, page vii](#)
- [Audience, page vii](#)
- [How This Guide Is Organized, page ix](#)
- [Conventions, page ix](#)
- [Product Documentation, page x](#)
- [Related Documentation, page xi](#)
- [Obtaining Documentation and Submitting a Service Request, page xi](#)

## Document Revision History

The Document Revision History table records technical changes to this document. The table shows the date of the change, and a brief summary of the change.

Date	Change Summary
November 17, 2009	Added Step 2 in the <a href="#">Configuring a DPE for Data, page 6-3</a> procedure of <a href="#">Chapter 6</a> .
February 14, 2009	Initial release.

## Audience

System integrators, network administrators, and network technicians use this installation guide to install BAC on the Solaris operating system and to set up the Device Provisioning Engine (DPE).

**Note**

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Within this installation guide you will encounter references to BAC. With two exceptions, these references are to the BAC software. The exceptions are when you are prompted to enter specific data that may also contain references to BAC, and references made to specific files, directories, or pathnames. In such instances, you must enter the characters exactly as they appear in this guide.

---



# How This Guide Is Organized

The major sections of this guide are:

Title	Description
<a href="#">Overview</a>	Provides general requirements for a successful installation of BAC.
<a href="#">Before Installing Broadband Access Center</a>	Describes factors to consider as you prepare to install BAC; for example, the individual components of BAC, the database requirements, and the order of operations for installing the software.
<a href="#">Installing Broadband Access Center</a>	Describes how to install the individual components of BAC in interactive or noninteractive modes from the command-line interface (CLI).
<a href="#">Post-Installation Activities</a>	Describes the tasks that you must perform following installation, such as installing your license file and configuring the syslog utility.
<a href="#">Upgrading Broadband Access Center</a>	Describes how to upgrade an earlier installation of Broadband Access Center for Cable to BAC 4.0.
<a href="#">Setting Up a Device Provisioning Engine</a>	Describes how to configure a BAC component, the DPE.
<a href="#">Uninstalling Broadband Access Center</a>	Describes how to uninstall BAC.
<a href="#">Network Registrar Configuration File Example</a>	Provides examples of files used to configure Cisco Network Registrar for high-speed data and voice technology deployments.
<a href="#">Installation Worksheet</a>	Provides you with a worksheet to note down the values that you enter while installing BAC.

## Conventions

This document uses the following conventions:

Item	Convention
Commands and keywords	<b>boldface</b> font
Variables for which you supply values	<i>italic</i> font
Displayed session and system information	<code>screen</code> font
Information you enter	<b>boldface</b> <code>screen</code> font
Variables you enter	<i>italic screen</i> font
Menu items and button names	<b>boldface</b> font
Selecting a menu item in paragraphs	<b>Option &gt; Network Preferences</b>
Selecting a menu item in tables	Option > Network Preferences

**Caution**

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

**Note**

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

**Tip**

Means *a helpful hint*. The description can present an optimum action to take.

## Product Documentation

**Note**

We sometimes update the printed and electronic documentation after original publication. Therefore, you should also review the documentation on [Cisco.com](http://www.cisco.com) for any updates.

[Table 1](#) describes the documentation that is available for this BAC release.

**Table 1**      **Product Documentation**

Document Title	Available Format
<i>Release Notes for Cisco Broadband Access Center, Release 4.0</i>	<ul style="list-style-type: none"> <li>PDF file on the product CD-ROM</li> <li>On Cisco.com: <a href="http://cisco.com/en/US/products/sw/netmgts/ps529/prod_release_notes_list.html">http://cisco.com/en/US/products/sw/netmgts/ps529/prod_release_notes_list.html</a></li> </ul>
<i>Installation and Setup Guide for Cisco Broadband Access Center, Release 4.0</i>	<ul style="list-style-type: none"> <li>PDF file on the product CD-ROM</li> <li>On Cisco.com: <a href="http://cisco.com/en/US/products/sw/netmgts/ps529/prod_installation_guides_list.html">http://cisco.com/en/US/products/sw/netmgts/ps529/prod_installation_guides_list.html</a></li> </ul>
<i>Cisco Broadband Access Center Administrator Guide, Release 4.0</i>	<ul style="list-style-type: none"> <li>PDF file on the product CD-ROM</li> <li>On Cisco.com: <a href="http://cisco.com/en/US/products/sw/netmgts/ps529/prod_maintenance_guides_list.html">http://cisco.com/en/US/products/sw/netmgts/ps529/prod_maintenance_guides_list.html</a></li> </ul>
<i>Cisco Broadband Access Center DPE CLI Reference, Release 4.0</i>	<ul style="list-style-type: none"> <li>PDF file on the product CD-ROM</li> <li>On Cisco.com: <a href="http://cisco.com/en/US/products/sw/netmgts/ps529/prod_command_reference_list.html">http://cisco.com/en/US/products/sw/netmgts/ps529/prod_command_reference_list.html</a></li> </ul>

## Related Documentation


**Note**

We sometimes update the printed and electronic documentation after original publication. Therefore, you should also review the documentation on [Cisco.com](http://cisco.com) for any updates.

[Table 2](#) describes additional documentation that is available for this release of BAC.

**Table 2**      **Related Documentation**

Document Title	Available Format
<i>Release Notes for Cisco Network Registrar 7.0</i>	On Cisco.com: <a href="http://cisco.com/en/US/products/sw/netmgts/ps1982/prod_release_notes_list.html">http://cisco.com/en/US/products/sw/netmgts/ps1982/prod_release_notes_list.html</a>
<i>Installation Guide for Cisco Network Registrar, Release 7.0</i>	On Cisco.com <a href="http://cisco.com/en/US/products/sw/netmgts/ps1982/prod_installation_guides_list.html">http://cisco.com/en/US/products/sw/netmgts/ps1982/prod_installation_guides_list.html</a>
<i>User Guide for Cisco Network Registrar, Release 7.0</i>	On Cisco.com: <a href="http://cisco.com/en/US/products/sw/netmgts/ps1982/products_user_guide_list.html">http://cisco.com/en/US/products/sw/netmgts/ps1982/products_user_guide_list.html</a>
<i>CLIFrame.html</i> in the <i>/docs</i> directory	On Cisco.com: <a href="http://cisco.com/en/US/products/sw/netmgts/ps1982/prod_command_reference_list.html">http://cisco.com/en/US/products/sw/netmgts/ps1982/prod_command_reference_list.html</a>
<i>Quick Start Guide for Cisco Network Registrar, Release 7.0</i>	On Cisco.com: <a href="http://cisco.com/en/US/products/sw/netmgts/ps1982/prod_installation_guides_list.html">http://cisco.com/en/US/products/sw/netmgts/ps1982/prod_installation_guides_list.html</a>

## Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

Subscribe to *What's New in Cisco Product Documentation* as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service and Cisco currently supports RSS version 2.0.





# CHAPTER 1

## Overview

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This chapter gives an overview of Cisco Broadband Access Center (BAC), and describes the factors that you must consider before installing BAC.

This chapter describes:

- [Product Overview, page 1-1](#)
- [Operating System Requirements, page 1-1](#)
- [Network Registrar Requirements, page 1-2](#)
- [BAC Components at a Glance, page 1-3](#)
- [Type of Installation, page 1-3](#)

## Product Overview

BAC is a distributed and scalable application that automates the tasks of provisioning and managing cable devices in a broadband service provider network. It provides a simple and easy way to deploy high-speed data, voice technology, and home networking devices. The application interfaces with Cisco Network Registrar, which includes a high-speed DHCP for IP address management and a Domain Name System (DNS) server.

BAC can be scaled to suit networks of virtually any size. It also offers high availability, made possible by the product's distributed architecture with centralized management.

This release provides features to provision and manage cable modems compliant with the DOCSIS 3.0 specification. With IP version 6 (IPv6) being a significant feature of DOCSIS 3.0, this release supports DHCPv6 and DNSv6.

## Operating System Requirements

You must install BAC on a Sun SPARC platform running the Solaris 9 or 10 operating system with at least 4 GB of memory. We recommend that you use a Sun SPARC multiprocessor platform.



### Note

Before installing BAC, download and install the recommended Solaris patches from the Sun Microsystems support site.

BAC ships with the required Java Runtime Environment under JDK 1.6.0\_02, which resides in the *BPR\_HOME/jre* directory.

For a list of Java Platform Standard Edition (Java SE) cluster patches recommended to successfully install BAC on a system that runs:

- Solaris 9, see [Table 1-1](#).
- Solaris 10, see [Table 1-2](#).

**Table 1-1** *Java Standard Edition Cluster Patches for Solaris 9*

Patch	Description
113096-03	X11 6.6.1 OWconfig patch
111711-16	Shared library patch for C++ (32-bit)
111712-16	Shared library patch for C++ (64-bit)
112963-32	Linker patch
113886-47	OpenGL 1.3 OpenGL patch for Solaris (32-bit)
113887-47	OpenGL 1.3 OpenGL patch for Solaris (64-bit)
112785-62	X11 6.6.1 Xsun patch

**Table 1-2** *Java Standard Edition Cluster Patches for Solaris 10*

Patch	Description
120900-04	Libzonecfg patch
121133-02	Zones library and zones utility patch
119254-44	Install and patch utilities patch
118918-24	Solaris crypto framework patch
119042-10	Svccfg and svcprop patch
119578-30	FMA patch
118833-36	Kernel patch

## Network Registrar Requirements



### Note

If you are not installing BAC extensions on Cisco Network Registrar, you do not need to install Network Registrar.

Before installing BAC extensions, be aware of these Network Registrar requirements:

- You must install version 7.0 of Network Registrar with BAC 4.0.
- You must install a Network Registrar DHCP server on a computer running Solaris 9 or 10.
- In a failover deployment of BAC, you must configure two redundant DHCP servers for failover.
- After you install BAC, ensure that Network Registrar scopes are configured to reflect failover capability and the topology of the network on which BAC is installed. For information on configuring failover on Network Registrar servers, see the *User Guide for Cisco Network Registrar 7.0*.

# BAC Components at a Glance

A BAC installation requires:

- A Regional Distribution Unit (RDU)

The RDU is the primary server in a BAC deployment. It contains the central BAC database and is the sole entry point for processing requests from the API.

- One or more Device Provisioning Engines (DPEs)

A DPE caches provisioning information and configuration requests, including the transfer of configuration files to devices. It is the major component of the provisioning group, handling all device interactions with the RDU.

The DPE is integrated with the Network Registrar DHCP server to control the assignment of IP addresses. Multiple DPEs can communicate with a single DHCP server.



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**Note** This release of BAC does not support installing the DPE on a hardware appliance.

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- A Key Distribution Center (KDC)

The KDC, along with the DPE registration service, handles the authentication of all voice technology media terminal adapters (MTAs).



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**Note** The KDC is required only when configuring a system to support voice technology operations using PacketCable.

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For performance reasons, install the KDC on a separate server.

- One or more Network Registrar servers

Network Registrar provides the DHCP and DNS functionality. Implementing DNS Update within Network Registrar increases the number of servers you need to deploy.

## Type of Installation

This guide describes the individual component installation, which installs one or more components of BAC: the RDU, one or more DPEs, Network Registrar extensions, and the KDC. For detailed procedures on installing components in the interactive or noninteractive modes, see [Chapter 3, “Installing Broadband Access Center.”](#)



**Note**

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This release does not feature a lab installation, but you can perform its equivalent by installing all BAC components on a single machine. To perform such an installation, we recommend that you have at least 350 MB of disk space available.

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## CHAPTER 2

# Before Installing Broadband Access Center

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This chapter explains how to prepare for a successful installation of Cisco Broadband Access Center (BAC) and describes:

- [BAC Components, page 2-1](#)
- [Installation and Startup Process, page 2-2](#)
- [Database Requirements, page 2-6](#)

## BAC Components

The BAC component installation program prompts you to install:

- Regional Distribution Unit (RDU)

The RDU is the primary server in the BAC provisioning system. You should install the RDU on a server that fulfills the requirements that are described in [Chapter 1, “Overview.”](#)

The RDU:

- Manages the generation of device configurations.
- Processes application programming interface (API) requests for all BAC functions.
- Manages the BAC system.

When you install the RDU, the installation program also installs the administrator user interface. The program also preloads required data into the RDU database, and starts the RDU daemon through the BAC process watchdog. The SNMP agent is also installed for the RDU. For details on configuring the SNMP agent, refer to the *Cisco Broadband Access Center DPE CLI Reference 4.0*. For information on the BAC process watchdog, refer to the *Cisco Broadband Access Center Administrator Guide 4.0*.

- Device Provisioning Engine (DPE)

The DPE is the major component of the provisioning group, handling all device interactions with the RDU. You should install a DPE on a server that meets the requirements described in [Chapter 1, “Overview.”](#)

The DPE:

- Caches device configurations generated at the RDU.
- Manages various CPE protocol services. These services obtain their operating instructions from the instruction cache.

The installation program installs a CLI on your system to help configure the DPE. The BAC process watchdog and the SNMP agent are installed for the DPE also. For information on configuring the DPE and configuring the SNMP agent, refer to the *Cisco Broadband Access Center DPE CLI Reference 4.0*.



**Note** The DPE is separately licensed and must be installed from the administrator user interface. For details on licensing in this BAC release and how to install your license, see [Licensing BAC, page 4-1](#). Also refer to the *Release Notes for Cisco Broadband Access Center 4.0*.

- Cisco Network Registrar extensions

The Network Registrar extensions are the link between BAC and Network Registrar. You should install this component on all Network Registrar servers in your BAC environment. If you are deploying BAC in a failover environment, ensure that you install the extensions on the failover servers also.



**Note** You must install the BAC Network Registrar extensions on a server running Network Registrar 7.0. If you do not want to install these extensions, you are not required to install Network Registrar.

- Key Distribution Center (KDC)

The KDC, along with the DPE registration service, handles the authentication of all PacketCable voice technology MTAs. For performance reasons, install the KDC on a separate server that meets the requirements described in [Chapter 1, “Overview.”](#)

The KDC requires service keys, which allow it to communicate with the DPE. For details, refer to the *Cisco Broadband Access Center DPE CLI Reference 4.0* and the *Cisco Broadband Access Center Administrator Guide 4.0*.



**Note** The KDC requires a license, which continues to be proprietary, as in previous BAC releases, and is licensed during BAC installation. For information on installing a KDC license, see [Installing Your KDC License, page 4-2](#).

## Installation and Startup Process



**Note** During installation, it may be necessary to install several Solaris patches on your computer. Should patch installation become necessary, refer to the Sun Microsystems support site to download these patches. For a list of recommended patches, see [Operating System Requirements, page 1-1](#).

To ensure a smooth installation and startup process:

- Step 1** Determine the computers and servers on which you are installing the BAC components.
- Step 2** Verify the file-system block size of the directory in which you intend to install the BAC database and the database transaction log files. See [Database Requirements, page 2-6](#).
- Step 3** Review the installation checklist described in [Table 3-1](#).

**Step 4** Install the RDU. Ensure that you know the location for the:

- Home directory
- Data directory
- Database logs directory

**Step 5** Install a DPE. Ensure that you know the location for the:

- Home directory
- Data directory
- Database logs directory

**Step 6** After installing the RDU, ensure that you:

- a. Obtain a valid BAC license file to provision all technologies. For details on obtaining and installing your license file, refer to the *Release Notes for the Cisco Broadband Access Center 4.0*.

You still require separate licenses—permanent or evaluation—for the following BAC components:

- The DPE
- The KDC, if you configure your network to support voice technology

- b. Verify that the RDU is running by starting the administrator user interface.

To launch the administrator user interface, enter the administrator's location from your web browser using:

`http://machine_name:port_number/`



---

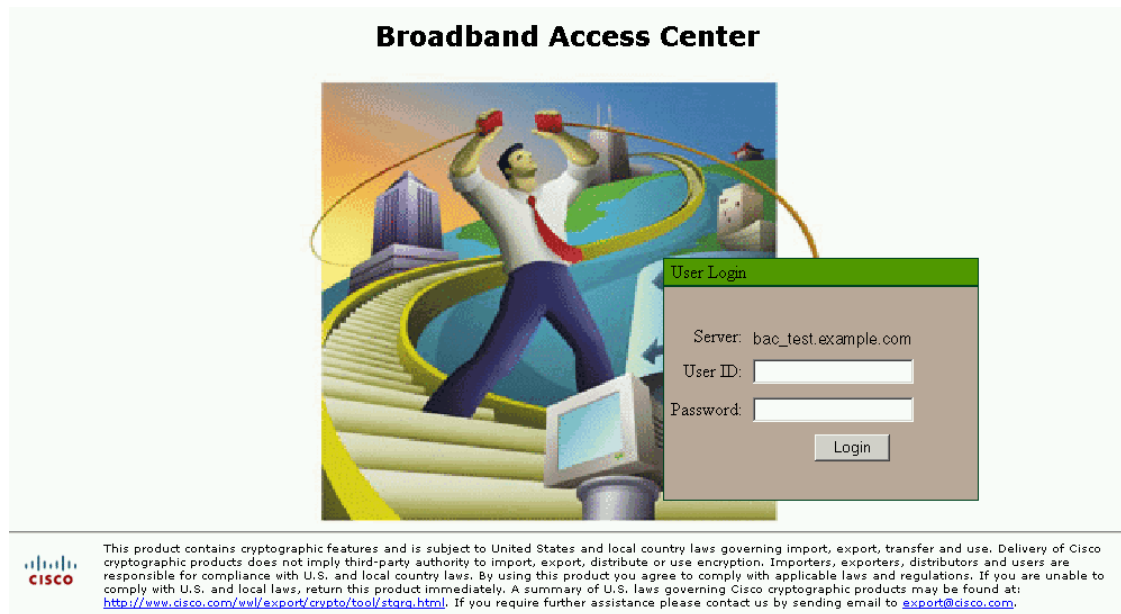
**Note** To access the administrator user interface using HTTP over SSL, enter:  
`https://machine_name:port_number/`

---

- *machine\_name*—Identifies the computer on which the RDU is running.
- *port\_number*—Identifies the computer port on which the server side of the administrator application is running. By default, this port number is:
  - 8100 for HTTP over TCP
  - 8443 for HTTP over SSL

The main login screen, as shown in Figure 2-1, appears.

**Figure 2-1 Login Screen**



- c. Change the BAC administrator's password.

To change the password, enter the default username (**admin**) and password (**changeme**).

Click **Login**.

The Change Password screen appears.

Enter a new password; ensure that this password has at least 8 characters.

Click **Login**.

- Step 7** Optionally, configure the syslog file for alerts. See [Configuring the Syslog Utility to Receive Alerts from BAC](#), page 4-3. You can set up the syslog file on any BAC component server.

- Step 8** After installing the DPE, ensure that you:

- a. Change the DPE login password and the privileged password from the command-line interface (CLI).

- To change the login password, access the CLI in the privileged mode, and enter:

```
bac_dpe# password password
```

where *password* identifies the new DPE password.

- To change the DPE privileged password, enter:

```
bac_dpe# enable password password
```

where *password* identifies the local configured password currently in effect or, optionally, provides a new password. If this parameter is omitted, you are prompted for the password.

For more information, refer to the *Cisco Broadband Access Center DPE CLI Reference 4.0*.

- b. Configure the DPE from the CLI as required. For configuration instructions, refer to the *Cisco Broadband Access Center DPE CLI Reference 4.0*.

**Step 9** Install and configure Network Registrar, if it is not already installed on your system. We recommend that you use Network Registrar 7.0. For more information on installing Network Registrar, refer to the *Installation Guide for Cisco Network Registrar 7.0*.

- When you install the Network Registrar Local Cluster (LCCM), ensure that you:
  - a. Obtain a valid Network Registrar license file for the local cluster.
  - b. On all Network Registrar local cluster servers, install BAC extensions. See [Installing BAC, page 3-3](#).
  - c. Configure Network Registrar, including its extensions. Specifically, you need to configure scopes, policies, client classes, and selection tags. See [Configuring Extensions, page 3-12](#). Also refer to the *User Guide for Cisco Network Registrar 7.0*.
  - d. Configure the Network Registrar syslog for alerts and debugging information. See [Configuring the Syslog Utility to Receive Alerts from BAC, page 4-3](#).
  - e. Validate the installation by connecting to the Network Registrar web UI and viewing it.
- When you install Network Registrar Regional Cluster (RCCM), ensure that you:
  - a. Identify the master server for Network Registrar Regional Installation, which administers all the configured Network Registrar local clusters. This server can be Solaris, Windows, or Linux. However, we recommend that you have the Solaris operating system on the Network Registrar Regional Server.
  - b. Obtain a valid central-cluster license file for the Network Registrar Regional Server.
  - c. After you install the BAC extensions on all Network Registrar local servers, replicate the local data into regional and pull the replica address space. For more information, refer to the *User Guide for Cisco Network Registrar 7.0*.
  - d. Alternatively, you can also create subnets, client classes, policies, and so on at RCCM and push them to the required LCCM DHCP server. For more information, refer to the *User Guide for Cisco Network Registrar 7.0*.

**Step 10** Install and configure the KDC. When you install the KDC, ensure that you:

- Obtain a valid BAC license. The KDC license is proprietary and is licensed during BAC installation. For information on installing the KDC license, see [Licensing BAC, page 4-1](#).
- Have the following information at hand:
  - KDC realm—Identified by a unique name, the KDC realm consists of a KDC and the clients and servers registered to that KDC.



**Note** The realm must match the certificate chain at the KDC.

- KDC FQDN—Identifies the fully qualified domain name on which the KDC server is located.
- KDC interface address—Identifies the interface (generally the IP address of the KDC server) on which the KDC listens for requests.

# Database Requirements

Before you install BAC, be aware of these database considerations:

- File-system block size
- Large file support

## File-System Block Size

For optimum performance and reliability of the BAC database, configure the file system or systems that contain the database files and database log files with an 8-KB or greater block size. 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 transaction log files. These directories are identified in BAC with the system variables *BPR\_DATA*, and *BPR\_DBLOG*, respectively.

To verify that a directory resides on a file system with a minimum 8-KB block size:

- 
- 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/CSCObac*.

For example:

```
# mount
/var on /dev/dsk/c0t0d0s4 read/write/setuid/intr/largefiles/logging/xattr/onerror=panic/
dev=2200004 on Thu Jun 15 16:58:21 2006
```

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

/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 larger than 2 GB. To verify large file support:

- 
- Step 1** Run the UNIX **mount** command without parameters.
- Step 2** Note whether the intended file system contains the keyword **largefiles**.

For example:

```
/var on /dev/dsk/c0t0d0s4 read/write/setuid/intr/largefiles/onerror=panic/dev=2200004 on  
Thu Jun 15 08:07:53
```

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

---







## CHAPTER 3

# Installing Broadband Access Center

This chapter explains the procedures you must follow to install Cisco Broadband Access Center (BAC) in a Solaris operating system environment.

This chapter includes:

- [Installing BAC, page 3-3](#)
- [Installing Components in Interactive Mode, page 3-3](#)
- [Installing Components in Noninteractive Mode, page 3-16](#)
- [Adding Components, page 3-31](#)

Before you install BAC, ensure that you are ready by reviewing the checklist that [Table 3-1](#) describes.

**Table 3-1**      **Installation Checklist**



Task	Checkoff
1. Verify if your system meets the minimum system hardware and software requirements described in <a href="#">Chapter 1, “Overview.”</a>	<input type="checkbox"/>
2. Ensure that you have <i>root</i> access to the computers on which you intend to install BAC components.	<input type="checkbox"/>
3. Save your license file on the system from which you intend to launch the BAC administrator user interface via a web browser. You need a valid service license file to configure BAC licensing.	<input type="checkbox"/>
4. Determine the home directory ( <i>BPR_HOME</i> ) in which you want to install the BAC component or components. The default directory is <i>/opt/CSCObac</i> . Ensure that the target installation directory has enough disk space.	<input type="checkbox"/>
 <b>Note</b> We recommend that you have at least 350 MB of disk space available.	

Table 3-1 Installation Checklist (continued)

Task	Checkoff
<p>5. For the RDU, determine where you want to install the data directory (<i>BPR_DATA</i>) and the database logs (<i>BPR_DBLOG</i>). The default directory is <i>/var/CSCObac</i>. Ensure that the target installation directory has enough disk space.</p> <p> <b>Note</b> We recommend that you locate the data directory on a different physical disk than the home directory; for example, <i>/var/disk0/CSCObac</i>. The disk should have at least 1 GB and up to 30 GB of free space. The installation program, by default, installs the data directory, the database transaction logs directory, and the logs directory in the same location. We recommend that you locate the database transaction logs directory on the fastest disk on the system. Also, ensure that 1 GB of disk space is available.</p>	<input type="checkbox"/>
6. For the RDU, determine the listening port number. The RDU uses this interface to communicate with other BAC components, such as DPEs and Cisco Network Registrar extension points. The default port is 49187.	<input type="checkbox"/>
7. For the RDU, determine the shared secret password that BAC servers on your network use as a token to authenticate communication with one another. The shared secret password should be the same for all BAC servers on your network.	<input type="checkbox"/>
<p>8. For the RDU, determine the ports through which you will access the administrator user interface using HTTP or HTTP over SSL (HTTPS). The default ports are:</p> <ul style="list-style-type: none"> <li>• 8100 for HTTP</li> <li>• 8443 for HTTPS</li> </ul>	<input type="checkbox"/>
<p>9. Ensure that Network Registrar 7.0 is installed and running on the servers on which you are installing BAC extensions.</p> <p><b>Note</b> To enable IPv6 support in BAC, you must install version 7.0 of Network Registrar.</p>	<input type="checkbox"/>
10. For the Network Registrar extensions, determine the name of the provisioning group to which the Network Registrar server belongs.	<input type="checkbox"/>
11. For the Network Registrar extensions, determine where you want to install the data directory ( <i>BPR_DATA</i> ). The default directory is <i>/var/CSCObac</i> .	<input type="checkbox"/>
12. Verify that you have the necessary Network Registrar configuration files. For an example of these configuration files, see <a href="#">Appendix A, “Network Registrar Configuration File Example.”</a>	<input type="checkbox"/>
13. Verify that you have the necessary KDC servers available.	<input type="checkbox"/>
<p>14. Enable your machine to support IPv6.</p> <p>To enable IPv6, log in as <i>root</i>, and run:</p> <pre># ifconfig intf inet6 plumb up # ifconfig intf inet6 plumb up # /usr/lib/inet/in.ndpd # touch /etc/hostname6.intf</pre> <p>where <i>intf</i> identifies the interface on which you want to enable IPv6.</p>	<input type="checkbox"/>


# Installing BAC

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

To install BAC:

- 
- Step 1** Log in to the intended BAC host as *root*.
- Step 2** At the Solaris system prompt, change directory to your CD-ROM drive or other installation media. Ensure that the **gzip** and **gtar** utilities are available on your system to decompress and unpack the BAC installation file, and:
- Change to the directory in which you will decompress and extract the installation file.
  - Decompress the file with the *.gtar.gz* extension. Enter:  

```
gunzip -d BAC_400_SolarisK9.gtar.gz
```
  - Unpack the file with the *.gtar* extension that gunzip decompressed. Enter:  

```
gtar -xvf BAC_400_SolarisK9.gtar
```
- The utility creates the *BAC\_400\_Solaris* directory into which the installation program is extracted.
-  **Note** If the program displays a checksum error while unpacking, specify the path to the GNU tar on your machine.
- 
- Step 3** After the installation program is extracted, you can choose to install the components in interactive mode or noninteractive mode.
- [Installing Components in Interactive Mode, page 3-3](#)
  - [Installing Components in Noninteractive Mode, page 3-16](#)
- 

## Installing Components in Interactive Mode

This section explains the procedures that you follow to install one or more BAC components interactively from the command line.

If you have not enabled IPv6 on your machine, a message similar to the following appears during installation:

```
Warning: IPv6 is not enabled on this system.
```

You can choose to enable IPv6 later, by running these commands:

```
# ifconfig intf inet6 plumb up
# ifconfig intf inet6 plumb up
# /usr/lib/inet/in.ndpd
# touch /etc/hostname6.intf
```

where *intf* identifies the interface on which you want to enable IPv6.

**Note**

Before you begin any of these procedures, you must complete the initial procedure described in [Installing BAC, page 3-3](#).

This section provides instructions on installing components in interactive mode:

- [Installing the RDU in Interactive Mode, page 3-4](#)
- [Installing a DPE in Interactive Mode, page 3-7](#)
- [Installing Network Registrar Extensions in Interactive Mode, page 3-9](#)
- [Installing the KDC in Interactive Mode, page 3-14](#)

## Installing the RDU in Interactive Mode

Install the RDU on a server running Solaris 9 or 10 that meets the requirements described in [Operating System Requirements, page 1-1](#). You should install the RDU on a high-end system that is the most reliable server in your network.

**Note**

We recommend that you configure the RDU server to use a static IP address.

To install the RDU, complete the initial installation described in [Installing BAC, page 3-3](#). Then:

**Step 1** To start the installation program in interactive mode, enter:

```
# pkgadd -d install-path/BAC_400_Solaris/CSCObac.pkg CSCObac
```

where *install-path* specifies the complete path to the directory in which the *BAC\_400\_Solaris* directory has been created.

The installation program verifies that you have installed the required patches to the Solaris operating system. When the verification ends, welcome information appears.

**Step 2** Press **Enter** to continue.

**Step 3** When the installation program prompts you to select one or more components, at the RDU prompt, enter **y** and press **Enter**.

To skip installing a DPE, Network Registrar extension points, and the KDC, enter **n** and press **Enter**. You can choose to install these components later.

For example:

```
----- Installation Components -----

Regional distribution unit (RDU) (y/n)? [n] y
Device Provisioning Unit (DPE) (y/n)? [n]
Cisco Network Registrar extension points (y/n)? [n]
Key Distribution Center (KDC) (y/n)? [n]
```

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

**Step 4** Enter **y** and press **Enter** to continue.

BAC performs lease query requests by binding to the IP addresses and ports that are described in [Table 3-2](#).

**Table 3-2 Lease Query Address for Binding**

Protocol	IP Address	Port
IPv4	Wildcard <sup>1</sup>	67
IPv6	Wildcard	547

1. The wildcard is a special local IP address. It usually means “any” and can only be used for bind operations.

If the installation program detects that either of these ports is being used by another process, it recommends that you use the dynamic ports that the operating system selects.

For example:

```
DHCPv4/DHCPv6 lease query port(s) (Udp/67 and Udp/547) is in use.
Configuring the RDU to use a dynamic port for DHCPv4/DHCPv6 lease query.
```

If port 67 and port 547 are available on the RDU, the installation program displays the home directory prompt.

**Step 5** To accept the default directory, `/opt/CSCObac`, press **Enter**; or enter a different directory.

For example:

```
----- Home Directory-----

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

A confirmation prompt appears.

**Step 6** To confirm the home directory location, enter **y** and press **Enter**.

The program prompts you to enter the data directory location.

**Step 7** To accept the default directory, `/var/CSCObac`, press **Enter**; or enter a different directory.

For example:

```
----- Data Directory-----

DB Data Directory Destination [/var/CSCObac] /var/disk0/CSCObac
```

A confirmation prompt appears.

**Step 8** To confirm the data directory location, enter **y** and press **Enter**.

The database log directory prompt appears.

**Step 9** To accept the default directory, `/var/CSCObac`, press **Enter**; or enter another directory.

For example:

```
----- DB Log Directory -----

DB Logs Directory Destination [/var/CSCObac] /var/disk1/CSCObac
```

A confirmation prompt appears.

**Step 10** To confirm the directory, enter **y** and press **Enter** to continue.

The program prompts you to enter the information related to the RDU, specifically the IP address and the listening port.

While the installation program obtains the IP address of the RDU automatically, you must enter a value for the listening port. The listening port is the port number that the RDU uses to communicate with other BAC components, such as DPEs and Network Registrar extension points.

- Step 11** To accept the default port number, 49187, press **Enter**; or enter another port number.



**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 with the correct RDU port number. For details on configuring the DPE, refer to the *Cisco Broadband Access Center DPE CLI Reference, 4.0*.

For example:

```
----- RDU information. -----
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 Listening Port [49187]
```

- Step 12** Confirm the listening port number; enter **y** and press **Enter** to continue.

The program prompts you to enter the shared secret password.

- Step 13** Enter the shared secret password that you want to use for authentication among BAC servers, and confirm the password.



**Note**

You must use the same shared secret password for the RDU, all DPEs, and Network Registrar extension points in your network.

For example:

```
Enter the password to be used for authentication between the BAC servers.
```

```
Enter the shared secret password [] <changeme>
```

```
Enter the shared secret password again [] <changeme>
```

- Step 14** Press **Enter** to continue.

The program displays the parameters you have selected to install the RDU.

- Step 15** Enter **y** and press **Enter** to confirm the installation parameters.

For example:

```
Home directory:/opt/CSCObac
Data directory:/var/disk0/CSCObac
DB Log directory:/var/disk1/CSCObac
RDU Port:49187
```

The program prompts you to enter the HTTP port for the administrator user interface.

- Step 16** To accept the default port, 8100, press **Enter**; or enter another port number.

For example:

```
Please enter Admin UI http port [8100]
```

- Step 17** Confirm the HTTP port; enter **y** and press **Enter**.

For example:

```
-----Confirmation-----
Admin UI http port: 8100

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

The program prompts you to enter the HTTPS port for the user interface.

- Step 18** To accept the default port, 8443, press **Enter**; or enter another port number.

For example:

```
Please enter Admin UI https port [8443]
```

- Step 19** Confirm the HTTPS port; enter **y** and press **Enter**.

The program displays the parameters you have selected to install the administrator user interface.

- Step 20** Enter **y** and press **Enter**.

For example:

```
-----Confirmation-----
Admin UI information
Http Port: 8100
Https Port: 8443
RDU port: 49187
RDU Name: bachost-rdu

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

The program prompts you to continue with the installation because the scripts used in the installation package run with superuser permissions.

- Step 21** Enter **y** and press **Enter**.

For example:

```
This package contains scripts which will be executed with superuser
permission during the process of installing this package.
```

```
Do you want to continue with the installation of <CSCObac> [y,n,?] y
```

After successful installation, the following message appears:

```
Installation of <CSCObac> was successful
```

## Installing a DPE in Interactive Mode

Install the DPE on a server running Solaris 9 or 10 that meets the requirements described in [Operating System Requirements, page 1-1](#).



### Note

We recommend that you configure the DPE server to use a static IP address.

During DPE installation, if the program detects a TFTP server or a ToD server running on the same server as the DPE, the installation displays an error message and quits. To kill the TFTP or ToD server, carry out the steps that the error message lists.

To install the DPE, complete the initial installation described in [Installing BAC, page 3-3](#). Then:

**Step 1** To start the installation program in interactive mode, enter:

```
# pkgadd -d install-path/BAC_400_Solaris/CSCObac.pkg CSCObac
```

where *install-path* specifies the complete path to the directory in which the *BAC\_400\_Solaris* directory has been created.

The installation program verifies that you have installed the required patches to the Solaris operating system. When the verification ends, welcome information appears.

**Step 2** Press **Enter** to continue.

**Step 3** When the installation program prompts you to select one or more components, at the DPE prompt, enter **y** and press **Enter**.

To skip installing the RDU, Network Registrar extension points, and the KDC, enter **n** and press **Enter**.

For example:

```
----- Installation Components -----

Regional distribution unit (RDU) (y/n)? [n]
Device Provisioning Unit (DPE) (y/n)? [n] y
Cisco Network Registrar extension points (y/n)? [n]
Key Distribution Center (KDC) (y/n)? [n]
```

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

**Step 4** Enter **y** and press **Enter** to continue.

The home directory prompt appears.

**Step 5** To accept the default directory, */opt/CSCObac*, press **Enter**; or enter another directory.

For example:

```
----- Home Directory-----

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

**Step 6** Confirm the directory location; enter **y** and press **Enter**.

The data directory prompt appears.



- Step 7** To accept the default directory, `/var/CSCObac`, press **Enter**; or enter another directory.  
For example:

```
----- Data Directory-----  
  
DB Data Directory Destination [/var/CSCObac]
```

- Step 8** Confirm the directory location; enter **y** and press **Enter**.  
The program prompts you to enter the shared secret password.

- Step 9** Enter the shared secret password that you want to use for authentication between the BAC servers.



**Note** You must use the same shared secret password for the RDU, all DPEs, and Network Registrar extension points in your network.

For example:

```
Enter the password to be used for authentication between the BAC servers.  
  
Enter the shared secret password [] <changeme>
```

- Step 10** Reenter the password for confirmation, and press **Enter**.  
The program prompts you to confirm the installation because the scripts used in the installation package run on superuser (root) permissions.
- Step 11** Enter **y** and press **Enter**.



**Note** If you choose not to proceed, the following message appears and the installation quits:  
Installation of <CSCObac> was terminated due to user request.  
No changes were made to the system.

The program begins the installation process. After successful installation, the following message appears:

```
Installation of <CSCObac> was successful
```

## Installing Network Registrar Extensions in Interactive Mode

Install BAC extensions on all Network Registrar servers in your BAC environment. If you are deploying BAC in a failover environment, you also must install the extensions on the failover servers. After you install extensions, you must configure them. This section explains how to install, configure, and validate these extensions.



**Note** We recommend that you configure the Network Registrar server to use a static IP address.

Before you install Network Registrar extensions, complete the initial installation described in [Installing BAC, page 3-3](#). Also, ensure that Network Registrar is running. Then:

**Step 1** To start the installation program in interactive mode, enter:

```
# pkgadd -d install-path/BAC_400_Solaris/CSCObac.pkg CSCObac
```

where *install-path* specifies the complete path to the directory in which the *BAC\_400\_Solaris* directory has been created.

The installation program verifies that you have installed the required patches to the Solaris operating system. When the verification ends, welcome information appears.

**Step 2** Press **Enter** to continue.

**Step 3** When the installation program prompts you to select one or more components, at the Network Registrar Extension Points prompt, enter **y** and press **Enter**.

To skip installing the RDU, a DPE, and the KDC, enter **n** and press **Enter**.

For example:

```
----- Installation Components -----

Regional distribution unit (RDU) (y/n)? [n]
Device Provisioning Unit (DPE) (y/n)? [n]
Cisco Network Registrar extension points (y/n)? [n] y
Key Distribution Center (KDC) (y/n)? [n]
```



**Note** The installation program validates your Network Registrar installation. You must install Network Registrar 7.0 on your server. If the required version is not installed, the installation process terminates, and you must upgrade to the required Network Registrar version before proceeding.

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

**Step 4** Enter **y** and press **Enter** to continue.

The home directory prompt appears.

**Step 5** To accept the default directory, */opt/CSCObac*, press **Enter**; or enter another directory.

For example:

```
----- Home Directory-----

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

The program then prompts you to confirm the directory.

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

The data directory prompt appears.

**Step 7** To accept the default directory, */var/CSCObac*, press **Enter**; or enter another directory.



**Note** The installation program, by default, installs the data directory (*BPR\_DATA*) on a different directory than the home directory (*BPR\_HOME*). We recommend that the data directory be on a different physical disk than the home directory; for example, */var/disk0/CSCObac*.

For example:

```
----- Data Directory-----
DB Data Directory Destination [/var/CSCObac] /var/disk0/CSCObac
```

**Step 8** To confirm the directory, enter **y** and press **Enter**.

The program prompts you to enter information on the RDU required to install the extensions.

**Step 9** Enter the IP address (or hostname) and the listening port of the host on which you have installed the RDU. To accept the default information, press **Enter**; or enter alternative information.

For example:

```
----- CNR EP Info. -----
Enter RDU IP Address or Hostname [bachost-rdu.example.com]
Enter RDU Listening Port [49187]
```

You are then prompted to enter the name of the extension point provisioning group.

**Step 10** Enter the name of the Network Registrar extension point group.

For example:

```
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 BAC command-line tool to change this value after you complete this
installation.
```

```
Enter Extension Point Provisioning Group [] group1
```

The program then asks you if you intend to provision PacketCable or voice technology devices.

**Step 11** Enter **y** and press **Enter** if you are using PacketCable devices; press **Enter** if you are not.

For example:

```
Are you going to use devices that support PacketCable voice technology? [n]
```

If you enter **n**, go to Step 15. If you entered **y**, the program prompts you to enter several voice technology properties.

**Step 12** Enter details on the KDC realm name, the IP addresses for the primary and secondary DHCP servers, and the primary and secondary DNS servers.

For example:



**Note** The warning in this example appears if there is more than one interface on your system.

```
----- PacketCable Configuration -----
Enter KDC realm Name [EXAMPLE.COM]

Warning: There is more than one interface on this system. Default to the 10.10.10.1

Enter IP Address for Secondary DHCP [10.10.10.1]

Enter IP Address for Primary DNS [10.10.10.3]

Enter IP Address for Secondary DHCP [10.10.10.2]

Enter IP Address for Secondary DNS [10.10.10.4]
```

**Step 13** Confirm the information; enter **y** and press **Enter**.

**Step 14** Press **Enter** to continue.

**Step 15** Enter the shared secret password that you want to use for authentication among BAC servers. You must use the same shared secret password for all BAC servers on your network.

For example:

```
Enter the password to be used for authentication between the BAC servers.
```

```
Enter the shared secret password [] <changeme>
```

```
Enter the shared secret password again [] <changeme>
```

**Step 16** Press **Enter**.

The program displays the installation parameters you have selected.

**Step 17** Enter **y** and press **Enter** to confirm the parameters, and install the Network Registrar extensions.

For example:

```
===== Confirmation =====  
RDU IP Address: 10.10.10.10  
RDU IP Port: 49187  
Extension Point Provisioning Group: group1  
PacketCable: y
```

**Step 18** Press **Enter** to continue.

The program prompts you to confirm the installation because the scripts used in the installation package run on superuser (root) permissions.

**Step 19** Enter **y** and press **Enter**.

For example:

```
This package contains scripts which will be executed with superuser  
permission during the process of installing this package.  
  
Do you want to continue with the installation of <CSCObac> [y,n,?] y
```

The installation proceeds, and displays the following message after successful installation:

```
Installation of <CSCObac> was successful
```

---

## Configuring Extensions

After you install the BAC extensions on the Network Registrar server, you must configure the extensions. The procedure described in this section assumes that:

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

To configure extensions:

**Step 1** Log in to the Network Registrar server, with *root* access.

**Step 2** At the command line, enter:

```
# NR_HOME/local/usrbin/nrcmd -N admin -P changeme -b <
BAC_HOME/cnr_ep/bin/bpr_cnr_enable_extpts.nrcmd
```

**Step 3** To reload the Network Registrar server, enter:

```
# /etc/init.d/nwreglocal stop
# /etc/init.d/nwreglocal start
```

Alternatively, to reload the DHCP server alone, enter:

```
# NR_HOME/local/usrbin/nrcmd -N admin -P changeme "dhcp reload"
```



**Note**

Before you can use the Network Registrar server, you must configure client classes, scope-selection tags, policies, and scopes. In an IPv6 environment, you must configure links and prefixes as well. Refer to the *User Guide for Cisco Network Registrar 7.0*.

## Validating Extensions

To validate the extensions installed on the Network Registrar server, from the Network Registrar Command Line Tool (**nrcmd**), run:



**Note**

Depending on whether you installed a local or regional cluster, the **nrcmd** tool is located in:

- Local—*/opt/nwreg2/local/usrbin*
- Regional—*/opt/nwreg2/regional/usrbin*

```
nrcmd> extension list
100 Ok
dextdropas:
  entry = dextdropas
  file = libdexextension.so
  init-args =
  init-entry =
  lang = Dex
  name = dextdropas
preClientLookup:
  entry = bprClientLookup
  file = libbprextensions.so
  init-args = BPR_HOME=/opt/CSCObac,BPR_DATA=/var/CSCObac
  init-entry = bprInit
  lang = Dex
  name = preClientLookup
prePacketEncode:
  entry = bprExecuteExtension
  file = libbprextensions.so
  init-args =
  init-entry = initExtPoint
```

```
lang = Dex
name = prePacketEncode
```

```
nrcmd>
```




---

**Note** The *BPR\_HOME* and *BPR\_DATA* values may be different in your installation.

---

Also in the **nrcmd** program, run:

```
nrcmd> dhcp listextensions
100 Ok
post-packet-decode: dextdropas
pre-packet-encode: prePacketEncode
pre-client-lookup: preClientLookup
post-client-lookup:
post-send-packet:
pre-dns-add-forward:
check-lease-acceptable:
post-class-lookup:
lease-state-change:
generate-lease:
environment-destructor:
pre-packet-decode:
post-packet-encode:

nrcmd>
```

## Installing the KDC in Interactive Mode

You must install the KDC only when configuring a system to support voice technology operations.

Install the KDC on a Solaris 9 or 10 server that meets the requirements described in [Operating System Requirements, page 1-1](#). For performance reasons, you should install the KDC on a separate server.

To install the KDC, complete the initial installation described in [Installing BAC, page 3-3](#). Then:

---

**Step 1** To start the installation program in interactive mode, enter:

```
# pkgadd -d install-path/BAC_400_Solaris/CSCObac.pkg CSCObac
```

where *install-path* specifies the complete path to the directory in which the *BAC\_400\_Solaris* directory has been created.

The installation program verifies that you have installed the required patches to the Solaris operating system. When the verification ends, welcome information appears.

**Step 2** Press **Enter** to continue.

**Step 3** When the installation program prompts you to select one or more components, at the KDC prompt, enter **y** and press **Enter**.

To skip installing the RDU, a DPE, and the Network Registrar extension points, enter **n** and press **Enter**.

For example:

```
----- Installation Components -----

Regional distribution unit (RDU) (y/n)? [n]
Device Provisioning Unit (DPE) (y/n)? [n]
Cisco Network Registrar extension points (y/n)? [n]
Key Distribution Center (KDC) (y/n)? [n] y
```

**Step 4** Confirm the components that you want to install; enter **y** and press **Enter**.

The home directory prompt appears.

**Step 5** To accept the default directory, */opt/CSCObac*, press **Enter**; or enter another directory.

For example:

```
----- Home Directory-----
Home Directory Destination [/opt/CSCObac]
```

A confirmation prompt appears.

**Step 6** Enter **y** and press **Enter**.

The data directory prompt appears.

**Step 7** To accept the default directory, */var/CSCObac*, press **Enter**; or enter another directory.

For example:

```
----- Data Directory-----
DB Data Directory Destination [/var/CSCObac]
```

**Step 8** To confirm, enter **y** and press **Enter**.

The KDC Configuration prompt appears.

**Step 9** Enter the KDC interface address, the fully qualified domain name (FQDN), and the Kerberos realm name. The realm name should be consistent with the realm you give to the DPEs that belong to this provisioning group.

For example:



**Note** The warning in this example appears if there is more than one interface on your system.

```
----- KDC Configuration -----

Key Distribution Center (KDC) Realm Name
Enter the Kerberos realm name for the KDC:
The realm name should be consistent with the realm you give to DPEs in this
provisioning group.

Warning: There is more than one interface on this system. Default to the 10.10.10.22

KDC Interface Address [10.10.10.22]:
KDC FQDN [bachost.example.com]:
KDC Realm [EXAMPLE.COM]:
```

**Step 10** To confirm your entry and continue, enter **y** and press **Enter**.

The program prompts you to enter a password to generate the KDC service key.

**Step 11** For each DPE, enter a password from 6 to 20 characters. The KDC service key mentioned here is one that you must generate on the DPE and the KDC to enable communication between the two components. To generate this service key, the password that you enter for the KDC must match the one that you enter for the corresponding DPE; otherwise, the DPE does not function.

For example:

```
Enter Password to generate Service-Key [] 12345678901234567890
```

**Note**

To generate the service key on the:

- DPE, use the **service packetcable 1.1 registration kdc-service-key** command from the DPE CLI. For details, refer to the *Cisco Broadband Access Center DPE CLI Reference 4.0*.
- KDC, use the KeyGen tool. For details, refer to the *Cisco Broadband Access Center Administrator Guide 4.0*.

**Step 12** Press **Enter**.

**Step 13** To confirm and continue, enter **y** and press **Enter**.

The program prompts you to enter the DPE FQDN.

**Step 14** Enter the FQDN of the DPE, and press **Enter**.

For example:

```
Enter Your DPE FQDN [] bac-dpe1.example.com
```

**Step 15** Enter **y** and press **Enter** to confirm and continue.

**Step 16** To add another DPE, enter **y** and press **enter**, or enter **n** and press **Enter**. The installation program uses the same voice technology shared key for all DPEs.

The program prompts you to confirm the installation because the scripts used in the installation package run on superuser (root) permissions.

**Step 17** Enter **y** and press **Enter**.

For example:

```
This package contains scripts which will be executed with superuser  
permission during the process of installing this package.
```

```
Do you want to continue with the installation of <CSCObac> [y,n,?] y
```

The installation proceeds, and displays the following message after successful installation:

```
Installation of <CSCObac> was successful
```

**Caution**

After installing the KDC, install the licenses and the chain of certificates; otherwise, you cannot launch the KDC.

## Installing Components in Noninteractive Mode

This section explains the procedures that you follow to install one or more BAC components from the command line in noninteractive mode.

In order to install BAC in noninteractive mode, you must first generate a response file, in which you store values for installing a component. You then use the response file as input while installing that component. For subsequent installations of the same component, you only need to use a single command, which removes all installation prompts and installs the component using the values contained in the response file.



To install BAC in noninteractive mode, you must perform two steps, each of which is described in detail in subsequent sections:

1. Generate a response file, using:

```
# pkgask -r response -d install-path/BAC_400_Solaris/CSCObac.pkg CSCObac
```

where *install-path* specifies the complete path to the directory in which the *BAC\_400\_Solaris* directory has been created.

Running this command does not install BAC on your system; it only generates the response file in which you store values for installation.

Note that there can only be one response file. As a result, you can use the response file only to install the component for which you generate the response file. If you want to install another component, you must generate a response file for that component and install that component using the response file generated for it.

For example, if you generate a response file to install the DPE and, subsequently, you want to install Network Registrar extensions, you must generate a response file separately to install Network Registrar extensions. You cannot use the response file that you generated to install the DPE to install Network Registrar extensions.

2. After you generate the response file, start the installation program in noninteractive mode, using:

```
# pkgadd -n -r response -a BAC_400_Solaris/bacadmin -d BAC_400_Solaris/CSCObac.pkg
```

For subsequent installations of the same component, you only need to run this **pkgadd** command.

If you have not enabled IPv6 on the machine, a warning message similar to the following appears:

Warning: IPv6 is not enabled on this system.

You can choose to enable IPv6 later, by running these commands:

```
# ifconfig intf inet6 plumb up
# ifconfig intf inet6 plumb up
# /usr/lib/inet/in.ndpd
# touch /etc/hostname6.intf
```

where *intf* identifies the interface on which you want to enable IPv6.

**Note**

Before you begin any of the procedures described in this section, complete the initial installation procedure described in [Installing BAC, page 3-3](#).

This section provides instructions on installing components in noninteractive mode:

- [Installing the RDU in Noninteractive Mode, page 3-18](#)
- [Installing a DPE in Noninteractive Mode, page 3-22](#)
- [Installing Network Registrar Extensions in Noninteractive Mode, page 3-24](#)
- [Installing the KDC in Noninteractive Mode, page 3-27](#)

## Installing the RDU in Noninteractive Mode

Install the RDU on a server running Solaris 9 or 10 that meets the requirements described in [Operating System Requirements, page 1-1](#). You should install the RDU on a high-end system that is the most reliable server in your network.



### Note

We recommend that you configure the RDU server to use a static IP address.

To install the RDU, complete the initial installation described in [Installing BAC, page 3-3](#). Then complete these procedures:

- [Generating the Response File for the RDU, page 3-18](#)
- [Installing the RDU Using the Response File, page 3-21](#)

## Generating the Response File for the RDU

Use this procedure to generate a response file for RDU installation:

**Step 1** To generate the response file, enter:

```
# pkgask -r response -d install-path/BAC_400_Solaris/CSCObac.pkg CSCObac
```

where *install-path* specifies the complete path to the directory in which the *BAC\_400\_Solaris* directory has been created.



### Note

The response file is created in the directory in which you run the **pkgask -r** command. If you want the response file to be generated in a specific location, enter:

```
# pkgask -r response-file-path -d CSCObac.pkg
```

where *response-file-path* specifies the path to the directory in which you want the response file to be generated; for example, */tmp/response*. You can also give the response file any name; for example, *outputFile*.

The installation program verifies that you have installed the required patches to the Solaris operating system. When the verification ends, welcome information appears.

**Step 2** Press **Enter** to continue.

**Step 3** When the installation program prompts you to select one or more components, at the RDU prompt, enter **y** and press **Enter**.

To skip installing a DPE, Network Registrar extension points, and the KDC, enter **n** and press **Enter**. You can choose to install these components later.

For example:

```
----- Installation Components -----

Regional distribution unit(RDU) (y/n)? [n] y
Device Provisioning Unit (DPE) (y/n)? [n]
Cisco Network Registrar extension points (y/n)? [n]
Key Distribution Center (KDC) (y/n)? [n]
```

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

**Step 4** Enter **y** and press **Enter** to continue.

BAC performs lease query requests by binding to the IP addresses and ports that are described in [Table 3-3](#).

**Table 3-3 Lease Query Address for Binding**

Protocol	IP Address	Port
IPv4	Wildcard <sup>1</sup>	67
IPv6	Wildcard	547

1. The wildcard is a special local IP address. It usually means “any” and can only be used for bind operations.

If the installation program detects that either of these ports is being used by another process, it recommends that you use the dynamic ports that the operating system selects.

For example:

```
DHCPv4/DHCPv6 lease query port(s) (Udp/67 and Udp/547) is in use.
Configuring the RDU to use a dynamic port for DHCPv4/DHCPv6 lease query.
```

If port 547 and port 67 are available, the installation program displays the home directory prompt.

**Step 5** To accept the default directory, `/opt/CSCObac`, press **Enter**; or enter a different directory.

For example:

```
----- Home Directory-----

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

A confirmation prompt appears.

**Step 6** To confirm the home directory location, enter **y** and press **Enter**.

The program prompts you to enter the data directory location.

**Step 7** To accept the default directory, `/var/CSCObac`, press **Enter**; or enter a different directory.

For example:

```
----- Data Directory-----

DB Data Directory Destination [/var/CSCObac] /var/disk0/CSCObac
```

A confirmation prompt appears.

**Step 8** To confirm the data directory location, enter **y** and press **Enter**.

The database log directory prompt appears.

**Step 9** To accept the default directory, `/var/CSCObac`, press **Enter**; or enter another directory.

For example:

```
----- DB Log Directory -----

DB Logs Directory Destination [/var/CSCObac] /var/disk1/CSCObac
```

A confirmation prompt appears.

**Step 10** To confirm the directory, enter **y** and press **Enter** to continue.

The program prompts you to enter the information related to the RDU, specifically the IP address and the listening port.

While the installation program obtains the IP address of the RDU automatically, you must enter a value for the listening port. The listening port is the port number that the RDU uses to communicate with other BAC components, such as DPEs and Network Registrar extension points.

- Step 11** To accept the default port number, 49187, press **Enter**; or enter another port number.



**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 with the correct RDU port number. For details on configuring the DPE, refer to the *Cisco Broadband Access Center DPE CLI Reference, 4.0*.

For example:

```
----- RDU information. -----

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 Listening Port [49187]
```

- Step 12** Confirm the listening port number; enter **y** and press **Enter** to continue.

The program prompts you to enter the shared secret password.

- Step 13** Enter the shared secret password that you want to use for authentication among BAC servers, and confirm the password.



**Note**

You must use the same shared secret password for the RDU, all DPEs, and Network Registrar extension points in your network.

For example:

```
Enter the password to be used for authentication between the BAC servers.

Enter the shared secret password [] <changeme>

Enter the shared secret password again [] <changeme>
```

- Step 14** Press **Enter** to continue.

The program displays the parameters you have selected to install the RDU.

- Step 15** Enter **y** and press **Enter** to confirm the installation parameters.

For example:

```
Home directory:/opt/CSCObac
Data directory:/var/disk0/CSCObac
DB Log directory:/var/disk1/CSCObac
RDU Port:49187
```

The program prompts you to enter the HTTP port for the administrator user interface.

- Step 16** To accept the default port, 8100, press **Enter**; or enter another port number.

For example:

```
Please enter Admin UI http port [8100]
```

**Step 17** Confirm the HTTP port; enter **y** and press **Enter**.

For example:

```
-----Confirmation-----
Admin UI http port: 8100

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

The program prompts you to enter the HTTPS port for the user interface.

**Step 18** To accept the default port, 8443, press **Enter**; or enter another port number.

For example:

```
Please enter Admin UI https port [8443]
```

**Step 19** Confirm the HTTPS port; enter **y** and press **Enter**.

The program displays the parameters you have selected to install the administrator user interface.

**Step 20** To confirm the parameters, enter **y** and press **Enter**.

For example:

```
-----Confirmation-----
Admin UI information
Http Port: 8100
Https Port: 8443
RDU port: 49187
RDU Name: bachost-rdu

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

**Step 21** To continue, press **Enter**.

A message appears indicating that a response file has been created.

For example:

```
Response file </tmp/response> was created.

Processing of request script was successful.
```

## Installing the RDU Using the Response File

After you generate the response file for the RDU, you can subsequently install the RDU using the following command:

```
# pkgadd -n -r response -a BAC_400_Solaris/bacadmin -d BAC_400_Solaris/CSCObac.pkg CSCObac
```

Once you run the above command, the program installs the RDU. After successful installation, the following message appears:

```
5.9
# Linking /etc/rc2.d/S81bprAgent to /etc/init.d/bprAgent
# Linking /etc/rc1.d/K05bprAgent to /etc/init.d/bprAgent
# Linking /etc/rc0.d/K05bprAgent to /etc/init.d/bprAgent
Starting BAC Process Watchdog...
BAC Process Watchdog has started.
```

```
Installation of <CSCObac> was successful.
```

## Installing a DPE in Noninteractive Mode

Install the DPE on a server running Solaris 9 or 10 that meets the requirements described in [Operating System Requirements, page 1-1](#).



### Note

We recommend that you configure the DPE server to use a static IP address.

During DPE installation, if the program detects a TFTP server or a ToD server running on the same server as the DPE, the installation displays an error message and quits. To kill the TFTP or ToD server, carry out the steps that the error message lists.

To install the DPE, complete the initial steps described in [Installing BAC, page 3-3](#). Then complete these procedures:

- [Generating the Response File for the DPE, page 3-22](#)
- [Installing the DPE Using the Response File, page 3-23](#)

## Generating the Response File for the DPE

Use this procedure to generate a response file for DPE installation:

**Step 1** To generate the response file, enter:

```
# pkgask -r response -d install-path/BAC_400_Solaris/CSCObac.pkg CSCObac
```

where *install-path* specifies the complete path to the directory in which the *BAC\_400\_Solaris* directory has been created.



### Note

The response file is created in the directory in which you run the **pkgask -r** command. If you want the response file to be generated in a specific location, enter:

```
# pkgask -r response-file-path -d CSCObac.pkg
```

where *response-file-path* specifies the path to the directory in which you want the response file to be generated; for example, */tmp/response*. You can also give the response file any name; for example, *outputFile*.

The installation program verifies that you have installed the required patches to the Solaris operating system. When the verification ends, welcome information appears.

**Step 2** Press **Enter** to continue.

**Step 3** When the installation program prompts you to select one or more components, at the DPE prompt, enter **y** and press **Enter**.

To skip installing the RDU, Network Registrar extension points, and the KDC, enter **n** and press **Enter**.

For example:

```
----- Installation Components -----

Regional distribution unit(RDU) (y/n)? [n]
Device Provisioning Unit (DPE) (y/n)? [n] y
Cisco Network Registrar extension points (y/n)? [n]
```

```
Key Distribution Center (KDC) (y/n)? [n]
```

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

**Step 4** Enter **y** and press **Enter** to continue.

The home directory prompt appears.

**Step 5** To accept the default directory, */opt/CSCObac*, press **Enter**; or enter another directory.  
For example:

```
----- Home Directory-----  
  
Home Directory Destination [/opt/CSCObac]
```

**Step 6** Confirm the directory location; enter **y** and press **Enter**.

The data directory prompt appears.

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

```
----- Data Directory-----  
  
DB Data Directory Destination [/var/CSCObac]
```

**Step 8** Confirm the directory location; enter **y** and press **Enter**.

The program prompts you to enter the shared secret password.

**Step 9** Enter the shared secret password that you want to use for authentication between the BAC servers. You must use the same shared secret password for the RDU, all DPEs, and Network Registrar extension points in your network.

For example:

```
Enter the password to be used for authentication between the BAC servers.  
  
Enter the shared secret password [] <changeme>
```

**Step 10** Reenter the password for confirmation, and press **Enter**.

A message appears indicating that a response file has been created.

For example:

```
Response file </tmp/response> was created.  
  
Processing of request script was successful.
```

## Installing the DPE Using the Response File

After you generate the response file for the DPE, you can subsequently install DPEs using the following command:

```
# pkgadd -n -r response -a BAC_400_Solaris/bacadmin -d BAC_400_Solaris/CSCObac.pkg CSCObac
```

Once you run the above command, the program installs the DPE. After successful installation, the following message appears:

```
5.9  
# Linking /etc/rc2.d/S81bprAgent to /etc/init.d/bprAgent
```

```
# Linking /etc/rc1.d/K05bprAgent to /etc/init.d/bprAgent
# Linking /etc/rc0.d/K05bprAgent to /etc/init.d/bprAgent
Starting BAC Process Watchdog...
BAC Process Watchdog has started.
```

Installation of <CSCObac> was successful.

## Installing Network Registrar Extensions in Noninteractive Mode

Install BAC extensions on all Network Registrar servers in your BAC environment. If you are deploying BAC in a failover environment, you also must install the extensions on the failover servers. After you install extensions, you must configure them. This section explains how to install, configure, and validate these extensions.



### Note

We recommend that you configure the Network Registrar server to use a static IP address.

Before you install Network Registrar extensions, complete the initial installation described in [Installing BAC, page 3-3](#). Also, ensure that Network Registrar is running. Then, complete the procedures described in this section:

- [Generating the Response File for Network Registrar Extensions, page 3-24](#)
- [Installing Network Registrar Extensions Using the Response File, page 3-27](#)

## Generating the Response File for Network Registrar Extensions

Use this procedure to generate a response file to install Network Registrar extensions:

**Step 1** To generate the response file, enter:

```
# pkgask -r response -d install-path/BAC_400_Solaris/CSCObac.pkg CSCObac
```

where *install-path* specifies the complete path to the directory in which the *BAC\_400\_Solaris* directory has been created.



### Note

The response file is created in the directory in which you run the **pkgask -r** command. If you want the response file to be generated in a specific location, enter:

```
# pkgask -r response-file-path -d CSCObac.pkg
```

where *response-file-path* specifies the path to the directory in which you want the response file to be generated; for example, */tmp/response*. You can also give the response file any name; for example, *outputFile*.

The installation program verifies that you have installed the required patches to the Solaris operating system. When the verification ends, welcome information appears.

**Step 2** Press **Enter** to continue.

**Step 3** When the installation program prompts you to select one or more components, at the Network Registrar Extension Points prompt, enter **y** and press **Enter**.

To skip installing the RDU, a DPE, and the KDC, enter **n** and press **Enter**.



For example:

```
----- Installation Components -----

Regional distribution unit(RDU) (y/n)? [n]
Device Provisioning Unit (DPE) (y/n)? [n]
Cisco Network Registrar extension points (y/n)? [n] y
Key Distribution Center (KDC) (y/n)? [n]
```




---

**Note** The installation program validates your Network Registrar installation. You must install Network Registrar 7.0 on your server. If the required version is not installed, the installation process terminates, and you must upgrade to the required Network Registrar version before proceeding.

---

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

**Step 4** Enter **y** and press **Enter** to continue.

The home directory prompt appears.

**Step 5** To accept the default directory, */opt/CSCObac*, press **Enter**; or enter another directory.

For example:

```
----- Home Directory-----

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

The program then prompts you to confirm the directory.

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

The data directory prompt appears.

**Step 7** To accept the default directory, */var/CSCObac*, press **Enter**; or enter another directory.




---

**Note** The installation program, by default, installs the data directory (*BPR\_DATA*) on a different directory than the home directory (*BPR\_HOME*). We recommend that the data directory be on a different physical disk than the home directory; for example, */var/disk0/CSCObac*.

---

For example:

```
----- Data Directory-----

DB Data Directory Destination [/var/CSCObac] /var/disk0/CSCObac
```

**Step 8** To confirm the directory, enter **y** and press **Enter**.

The program prompts you to enter information on the RDU required to install the extensions.

**Step 9** Enter the IP address (or hostname) and the listening port of the host on which you have installed the RDU. To accept the default information, press **Enter**; or enter alternative information.

For example:

```
----- CNR EP Info. -----

Enter RDU IP Address or Hostname [bachost-rdu.example.com]
Enter RDU Listening Port [49187]
```

You are then prompted to enter the name of the extension point provisioning group.

- Step 10** Enter the name of the Network Registrar extension point group.

For example:

```
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 BAC command-line tool to change this value after you complete this
installation.
```

```
Enter Extension Point Provisioning Group [] group1
```

The program then asks you if you intend to provision PacketCable or voice technology devices.

- Step 11** Enter **y** and press **Enter** if you are using PacketCable devices; press **Enter** if you are not.

For example:

```
Are you going to use devices that support PacketCable voice technology? [n]
```

If you enter **n**, go to Step 15. If you enter **y**, the program prompts you to enter several voice technology properties.

- Step 12** Enter details on the KDC realm name, the IP addresses for the primary and secondary DHCP servers, and the primary and secondary DNS servers.

For example:




---

**Note** The warning in this example appears if there is more than one interface on your system.

---

```
----- PacketCable Configuration -----
```

```
Enter KDC realm Name [EXAMPLE.COM]
```

```
Warning: There is more than one interface on this system. Default to the 10.10.10.1
```

```
Enter IP Address for Primary DHCP [10.10.10.1]
```

```
Enter IP Address for Primary DNS [10.10.10.3]
```

```
Enter IP Address for Secondary DHCP [10.10.10.2]
```

```
Enter IP Address for Secondary DNS [10.10.10.4]
```

- Step 13** Confirm the information; enter **y** and press **Enter**.

- Step 14** Press **Enter** to continue.

- Step 15** Enter the shared secret password that you want to use for authentication among BAC servers. You must use the same shared secret password for all BAC servers on your network.

For example:

```
Enter the password to be used for authentication between the BAC servers.
```

```
Enter the shared secret password [] <changeme>
```

```
Enter the shared secret password again [] <changeme>
```

- Step 16** Press **Enter**.

The program displays the installation parameters you have selected.

- Step 17** Enter **y** and press **Enter** to confirm the parameters, and install the Network Registrar extensions.

For example:

```
===== Confirmation =====
RDU IP Address: 10.10.10.10
RDU IP Port: 49187
Extension Point Provisioning Group: group1
PacketCable: y
```

**Step 18** To continue, press **Enter**.

A message appears indicating that a response file has been created.

For example:

```
Response file </tmp/response> was created.

Processing of request script was successful.
```

## Installing Network Registrar Extensions Using the Response File

After you generate the response file for Network Registrar extensions, you can subsequently install extensions using the following command:

```
# pkgadd -n -r response -a BAC_400_Solaris/bacadmin -d BAC_400_Solaris/CSCObac.pkg CSCObac
```

Once you run the above command, the program installs Network Registrar extensions. After successful installation, the following message appears:

```
5.9
Starting BAC Process Watchdog...

Installation of <CSCObac> was successful.
```

After you install the extensions, you must configure and validate them. For details, see [Configuring Extensions, page 3-12](#), and [Validating Extensions, page 3-13](#).

## Installing the KDC in Noninteractive Mode

You must install the KDC only when configuring a system to support voice technology operations.

Install the KDC on a Solaris 9 or 10 server that meets the requirements described in [Operating System Requirements, page 1-1](#). For performance reasons, you should install the KDC on a separate server.

To install the Key Distribution Center (KDC), complete the initial installation described in [Installing BAC, page 3-3](#). Then complete the procedures described in this section:

- [Generating the Response File for the KDC, page 3-27](#)
- [Installing the KDC Using the Response File, page 3-30](#)

## Generating the Response File for the KDC

Use this procedure to generate a response file for KDC installation:

**Step 1** To generate the response file, enter:

```
# pkgask -r response -d install-path/BAC_400_Solaris/CSCObac.pkg CSCObac
```

where *install-path* specifies the complete path to the directory in which the *BAC\_400\_Solaris* directory has been created.



**Note** The response file is created in the directory in which you run the **pkgask -r** command. If you want the response file to be generated in a specific location, enter:

```
# pkgask -r response-file-path -d CSCObac.pkg
```

where *response-file-path* specifies the path to the directory in which you want the response file to be generated; for example, */tmp/response*. You can also give the response file any name; for example, *outputFile*.

The installation program verifies that you have installed the required patches to the Solaris operating system. When the verification ends, welcome information appears.

**Step 2** Press **Enter** to continue.

**Step 3** When the installation program prompts you to select one or more components, at the KDC prompt, enter **y** and press **Enter**.

To skip installing the RDU, a DPE, and the Network Registrar extension points, enter **n** and press **Enter**.

For example:

```
----- Installation Components -----  
  
Regional distribution unit(RDU) (y/n)? [n]  
Device Provisioning Unit (DPE) (y/n)? [n]  
Cisco Network Registrar extension points (y/n)? [n]  
Key Distribution Center (KDC) (y/n)? [n] y
```

**Step 4** Confirm the components that you want to install; enter **y** and press **Enter**.

The home directory prompt appears.

- Step 5** To accept the default directory, */opt/CSCObac*, press **Enter**; or enter another directory.  
For example:

```
----- Home Directory-----  
  
Home Directory Destination [/opt/CSCObac]
```

A confirmation prompt appears.

- Step 6** Enter **y** and press **Enter**.

The data directory prompt appears.

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

```
----- Data Directory-----  
  
DB Data Directory Destination [/var/CSCObac]
```

- Step 8** To confirm, enter **y** and press **Enter**.

The KDC Configuration prompt appears.

- Step 9** Enter the KDC interface address, the fully qualified domain name (FQDN), and the Kerberos realm name. The realm name should be consistent with the realm you give to the DPEs that belong to this provisioning group.

For example:




---

**Note** The warning in this example appears if there is more than one interface on your system.

---

```
----- KDC Configuration -----  
  
Key Distribution Center (KDC) Realm Name  
Enter the Kerberos realm name for the KDC:  
The realm name should be consistent with the realm you give to DPEs in this  
provisioning group.  
  
Warning: There is more than one interface on this system. Default to the 10.10.10.22  
  
KDC Interface Address [10.10.10.22]:  
KDC FQDN [bachost.example.com]:  
KDC Realm [EXAMPLE.COM]:
```

- Step 10** To confirm your entry and continue, enter **y** and press **Enter**.

The program prompts you to enter a password to generate the KDC service key.

- Step 11** For each DPE, enter a password from 6 to 20 characters. The KDC service key mentioned here is one that you must generate on the DPE and the KDC to enable communication between the two components. To generate this service key, the password that you enter for the KDC must match the one that you enter for the corresponding DPE; otherwise, the DPE does not function.

For example:

```
Enter Password to generate Service-Key [] 12345678901234567890
```

**Note**

To generate the service key on the:

- DPE, use the **service packetcable 1..1 registration kdc-service-key** command from the DPE CLI. For details, refer to the *Cisco Broadband Access Center DPE CLI Reference 4.0*.
- KDC, use the KeyGen tool. For details, refer to the *Cisco Broadband Access Center Administrator Guide 4.0*.

**Step 12** Press **Enter**.

**Step 13** To confirm and continue, enter **y** and press **Enter**.

The program prompts you to enter the DPE FQDN.

**Step 14** Enter the FQDN of the DPE.

For example:

```
Enter Your DPE FQDN [] bac-dpe1.example.com
```

**Step 15** Press **Enter** to confirm and continue.

**Step 16** To add another DPE, enter **y** and press **enter**, or enter **n** and press **Enter**. The installation program uses the same voice technology shared key for all DPEs.

A message appears indicating that a response file has been created.

For example:

```
Response file </tmp/response> was created.

Processing of request script was successful.
```

## Installing the KDC Using the Response File

After you generate the response file for the KDC, you can subsequently install the KDC using the following command:

```
# pkgadd -n -r response -a BAC_400_Solaris/bacadmin -d BAC_400_Solaris/CSCObac.pkg CSCObac
```

Once you run the above command, the program installs the KDC. After successful installation, the following message appears:

```
5.9
# Linking /etc/rc2.d/S81bprAgent to /etc/init.d/bprAgent
# Linking /etc/rc1.d/K05bprAgent to /etc/init.d/bprAgent
# Linking /etc/rc0.d/K05bprAgent to /etc/init.d/bprAgent
Starting BAC Process Watchdog...
BAC Process Watchdog has started.
```

```
Installation of <CSCObac> was successful.
```

# Adding Components

This section describes how you can add one component of BAC to a system on which other components have already been installed. This situation arises largely in a deployment similar to a lab installation, where, for the purposes of testing, more than one component is installed on a single machine. The definitions file (*bpr\_definitions.sh*) is updated whenever you add new components.

**Note**

---

Before proceeding to add components, ensure that all the components belong to the BAC 4.0 version.

---

When the installation program detects the presence of one component on your system, it does not allow you the option of adding that particular component. It prompts you to add or install other components only.

For example, if you installed a DPE on a system and then rerun the installation program, the program does not give you the option of installing the DPE.

```
Regional distribution unit(RDU) (y/n)? [n]
Cisco Network Registrar extension points (y/n)? [n] n
Key Distribution Center (KDC) (y/n)? [n]
```

The procedures for adding a component are similar to those for a fresh installation, except that the program does not allow you to add the component that you have already installed.

**Note**

---

You cannot reinstall a component that you have already installed. If you must carry out a reinstallation, first uninstall that component, and then install it again.

---







## CHAPTER 4

# Post-Installation Activities

---

This chapter describes the tasks that you perform after installing Cisco Broadband Access Center (BAC):

- [Licensing BAC, page 4-1](#)
- [Enabling a Network Registrar Spoofing DNS Server, page 4-3](#)
- [Configuring the Syslog Utility to Receive Alerts from BAC, page 4-3](#)

## Licensing BAC

This BAC release enables licensing using a service file. These licenses allow you to provision a set number of services using BAC. Each service translates to three IP addresses provisioned in the system; thus, a 10,000 service license equates to 30,000 IP addresses. The license file that you receive will contain the number of IP addresses that are licensed, not the number of services that you purchased.



**Caution**

---

Do not edit your license file. Changing the data in any way invalidates the license file.

---

You still require separate licenses for the following BAC components:

- The DPE
- The KDC, if you configure your network to support voice technology

The DPE license is contained within the license file and licenses the DPE when you install the license file from the administrator user interface. The KDC license continues to be proprietary, as in previous BAC releases, and is licensed during BAC installation.

For details on how to obtain your license file, refer to the *Release Notes for Cisco Broadband Access Center 4.0*.

## Installing Your License File

Before installing your license file, ensure that you back up your licenses in case you have to reinstall the BAC software.

To install your permanent or evaluation license:

**Step 1** Once you receive your license file, save each file to the local system on which you intend to launch your web browser.

**Step 2** Launch your web browser on that system.

**Step 3** Enter the administrator's location using this syntax:

`http://machine_name:port_number/`

- *machine\_name*—Identifies the computer on which the RDU is running.



**Note** To access the administrator user interface via HTTP over SSL, also known as HTTPS, enter:  
`https://machine_name:port_number/`

- *port\_number*—Identifies the computer port on which the server side of the administrator application runs. The default port number is:
  - 8100 for HTTP over TCP
  - 8443 for HTTP over SSL

The main login page appears.

**Step 4** Enter the default username (**admin**) and password (**changeme**).



**Note** If you are logging in for the first time, the Change Password screen appears. Enter a new password and confirm it.

**Step 5** Click **Login**.

The Main Menu page appears.

**Step 6** Click the license link at the top of the Main Menu page, or choose **Configuration > License Keys**.

The Manage License Keys page appears.

**Step 7** In the License File field, enter the complete path to the location of the license file on your local system. Remember to include the name of the license file while specifying the pathname.

Or, click **Browse** and navigate to the license file.

**Step 8** Click **Add/Upgrade**.

The details regarding the number of services and the DPEs that you are licensed to use appear.

## Installing Your KDC License

Obtain a KDC license from your Cisco representative and then install it in the correct directory.

To install the KDC license file (*bacckdc.license*):

**Step 1** Obtain your license file from your Cisco representative.

**Step 2** Log in to the BAC host as root.

**Step 3** Change to the *BPR\_HOME/kdc* directory.

**Step 4** Copy the license file to this *BPR\_HOME/kdc* directory.

**Caution**

Be careful not to copy the license file as an ASCII file. The file contains binary data susceptible to unwanted modification during an ASCII transfer.

Do not copy KDC license files between operating systems because the transfer process may damage the file.

**Step 5** To restart the KDC server and make the changes take effect, run the **bprAgent restart kdc** command from the */etc/init.d* directory.

## Enabling a Network Registrar Spoofing DNS Server

A spoofing DNS server redirects all DNS requests to the same IP address. You can enable spoofing to enforce a self-provisioning flow for a new subscriber.

For example, assume that a DNS host is *dns.example.com*, and has an IP address of 10.10.10.5. Assume also that the web server with the self-provisioning flow is 10.10.10.6.

On the DNS server, set the following parameters in Cisco Network Registrar:

```
nrcmd> zone . delete
nrcmd> zone . create primary dns.example.com postmaster.dns.example.com
nrcmd> zone . addrr * a 10.10.10.6
nrcmd> save
nrcmd> dns reload
```

When DNS reloads, the changes take effect.

On the DHCP server, set the following parameters in Network Registrar:

```
nrcmd> policy unprovisioned setoption domain-name-servers 10.10.10.5
nrcmd> policy unprovisioned setoption domain-name example.com
nrcmd> save
nrcmd> dhcp reload
```

## Configuring the Syslog Utility to Receive Alerts from BAC

You can configure the syslog file on any BAC component server to receive alerts and debugging information from the system.

**Note**

Configuring the syslog file is an optional task.

BAC generates alerts through the Solaris syslog service. Syslog is a client-server protocol that manages the logging of information on UNIX. BAC syslog alerts are not a logging service; they notify that a problem exists, but do not necessarily define the specific cause of the problem. This information might reside in the appropriate BAC log files (*rdu.log* and *dpe.log*). If you choose to configure the syslog file, these alerts are directed to a separate log file.

For more information on error messages and alerts, refer to the *Cisco Broadband Access Center Administrator Guide 4.0*.

To configure the syslog utility on the Network Registrar extension points and the RDU server:

**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/bac.log
```

**Step 3** Open the */etc/syslog.conf* file with a text editor, such as *vi*.

**Step 4** Add this line to the */etc/syslog.conf* file:

```
local6.info          /var/log/bac.log
```



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

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

**Step 6** To force the syslog utility to accept the new configuration, enter:

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

```
# kill -HUP 217
```



**Note** The process ID (PID) in this example is 217, but may change when you run **ps -ef | grep syslogd**. Use the correct output from that command as the input to **kill -HUP**.

Syslog is now ready to receive alerts from BAC.



## CHAPTER 5

# Upgrading Broadband Access Center

This chapter describes how to upgrade a Cisco Broadband Access Center for Cable (BACC) 2.6.2.7 installation to Cisco Broadband Access Center (BAC) 4.0. If you have a BAC release preceding BACC 2.6.2.7, you must first upgrade your system to BACC 2.6.2.7 and then complete this upgrade procedure.

This BAC release supports online migration, using which you can migrate one server at a time without disrupting the entire BAC deployment.



**Caution**

Before upgrading to 4.0, ensure that you obtain the license file that this release supports. Once the upgrade is complete, the installation program deletes all existing license keys. You must then install the license file that 4.0 supports using the administrator user interface. For details on obtaining and installing the license file, see the *Release Notes for the Cisco Broadband Access Center 4.0*.

Table 5-1 summarizes the upgrade tasks required for the different BAC components.

**Table 5-1 Upgrading to BAC 4.0**

Version	RDU	DPE	Network Registrar Extension Points	KDC
BACC 2.6.2.7	Run <b>pkgadd</b> . At the end, the installer prompts you to run the migration tool.	Run <b>pkgadd</b> to upgrade the DPE.	Run <b>pkgadd</b> to upgrade the Network Registrar extensions.	Run <b>pkgadd</b> to upgrade the KDC.

When upgrading to 4.0 from 2.6.2.7, you must enter a new target location for these directories:

- Home (*BPR\_HOME*)
- Data (*BPR\_DATA*)
- Database logs (*BPR\_DBLOG*)



**Note**

Once the upgrade is complete, BAC does not restart the process watchdog (bprAgent) automatically. You must migrate your existing database first.

The BAC online upgrade procedure requires that you upgrade the components in the order specified below. Performing the upgrade in any other order results in errors during provisioning.

1. [Before You Begin, page 5-2](#)
2. [Upgrading the RDU, page 5-2](#)
3. [Upgrading the DPE, page 5-3](#)
4. [Upgrading Network Registrar Extensions, page 5-4](#)
5. [Upgrading the KDC, page 5-5](#)

## Before You Begin

Before upgrading BAC components, ensure that you back up the RDU database files.

To back up the RDU database, run the **backupDb.sh** script in the *BPR\_HOME/rdu/bin* directory.

For example:

```
# backupDb.sh /var/backup
```

where */var/backup* identifies the database backup directory.

In this example, all backup database files are stored in a directory called */var/backup/rdu-backup-20071116-031028*. The last subdirectory (*rdu-backup-20070316-111028*) is automatically created with a current time stamp.

**Note**

The time-stamped subdirectory format is *rdu-backup-yyyyMMdd-HHmmss*. In this example, the subdirectory would be *rdu-backup-20071116-031028*, meaning that the directory contains a backup that was started at 3:10:28 a.m. on November 16, 2007.

For additional information on using the **backupDb.sh** tool, refer to the *Cisco Broadband Access Center Administrator Guide 4.0*.

## Upgrading the RDU

Before upgrading the RDU, we recommend that you archive your files in the *BPR\_HOME/rdu/conf* directory.

To upgrade the RDU:

- 
- Step 1** Disable access to the RDU from the operations support system.
  - Step 2** Back up the existing RDU database, using the **backupDb.sh** tool. For details, refer to the *Cisco Broadband Access Center Administrator Guide 4.0*.

For example:

```
# /opt/CSCObpr/rdu/bin/backupDb.sh -nosubdir /disk1/backup
```

- **-nosubdir**—Disables the automatic creation of a subdirectory. If you do not use this option, a subdirectory is created and reported to the console.
- */disk1/backup*—Identifies the location for the database backup files.

- Step 3** Verify if the database has been backed up by checking the *history.log* file, which resides in the *BPR\_DATA* directory.
- Step 4** Restore the database that you have backed up to a consistent state, using the **recoverDb.sh** tool. For details, refer to the *Cisco Broadband Access Center Administrator Guide 4.0*.
- For example:
- ```
# /opt/CSCObpr/rdu/bin/recoverDb.sh /disk1/backup
```
- where */disk1/backup* identifies the location of the database backup files.
- Step 5** Copy the backed-up database to a safe location.
- Step 6** If the operating system (OS) on which the existing BAC version runs does not meet the requirements for the 4.0 release, upgrade the OS.
- Step 7** Install the 4.0 version.
- For example:
- ```
# pkgadd -d BAC_Solaris/CSCObac.pkg -a BAC_400_Solaris/bacadmin CSCObac
```
- The installation program prompts you to enter locations for the:
- Home directory (*BPR\_HOME*)
  - Database directory (*BPR\_DATA*)
  - Database logs directory (*BPR\_DBLOG*)
- It then upgrades the necessary libraries and property files but leaves your RDU database intact. After installation is complete, it prompts you to migrate your RDU database.
- Step 8** After the installation is complete, upgrade the RDU database by following the steps described in [Migrating the RDU Database, page 5-5](#).

## Upgrading the DPE

Before upgrading your DPE, we recommend that you archive your files in the *BPR\_HOME/dpe/conf* directory.

To upgrade the installed DPE from BACC 2.6.2.7 to BAC 4.0:

- Step 1** Run the **pkgadd -d BAC\_Solaris/CSCObac.pkg -a BAC\_400\_Solaris/bacadmin CSCObac** command.

Output similar to the following appears. The output has been trimmed for brevity.

```
Processing package instance <CSCObac> from </var/CSCObac.pkg>
```

```
Cisco BAC product
(sparc) 4.0
CSCObpr
```

```
Welcome to the Cisco Broadband Access Center for (BAC) installation program. This
installation program installs BAC on your system.
```

```
Press Enter to Continue or q to Quit:
```

```

Upgrading BAC from 2.6.2.7 to 4.0. Are you sure? [n]: y

Stopping BAC Process Watchdog...

...

File installation completed.
...

Installation of <CSCObac> was successful.

```

**Step 2** To verify if the version information indicates BAC release 4.0, enter:

```
# pkgparam CSCObac VERSION
```

**Step 3** You must manually restart the DPE process to finish the upgrade process.

For example, from the command line, run:

```
# /etc/init.d/bprAgent start dpe
```

## Upgrading Network Registrar Extensions

Before upgrading Cisco Network Registrar extensions, we recommend that you archive your files in the *BPR\_HOME/cnr\_ep/conf* directory.

To upgrade the Network Registrar extensions from BACC 2.6.2.7 to BAC 4.0:

**Step 1** Run the `pkgadd -d BAC_Solaris/CSCObac.pkg -a BAC_400_Solaris/bacadmin CSCObac` command.

**Step 2** Stop the Network Registrar Server Agent when prompted.

The upgrade script automatically copies the upgraded extension point files to the required directories. When complete, it prompts you to restart the Network Registrar Server Agent.

**Step 3** To verify if the output information indicates BAC release 4.0, enter:

```
# pkgparam CSCObac VERSION
```

**Step 4** Go to the *BPR\_HOME/lib* directory. If the upgrade was successful, the directory content appears similar to the list of installed files for the DPE upgrade with the addition of the `libbprextensions-2x.so` file.

**Step 5** If a second check is required to verify upgrade success, go to the *CNR\_HOME/extensions/dhcp/dex* directory and verify that these files appear:

```

-rwxr-xr-x 1 root bin 60904 Oct 29 2003 libdexextension.so
-rwxr-xr-x 1 root other 1530628 Jul 22 12:43 libbprextensions-2x.so
-rwxr-xr-x 1 root other 1560748 Aug 11 12:49 libbprextensions.so

```

Depending on the components installed, the directory content shown in this procedure may differ from the output featured above.



# Upgrading the KDC

**Note**

The BAC 4.0 KDC requires a new license. Before you start the BAC process watchdog, ensure that the correct license and certificates are installed.

To upgrade the KDC from BACC 2.6.2 to BAC 4.0:

- 
- Step 1** Run the `pkgadd -d BAC_Solaris/CSCObac.pkg -a BAC_400_Solaris/bacadmin CSCObac` command.
- Step 2** Manually start the BAC process watchdog to complete the upgrade process.
- Step 3** To verify if the output information indicates BAC release 4.0, enter:
- ```
# pkgparam CSCObac VERSION
```
- 

## Migrating the RDU Database

The RDU database migration script lets you migrate your RDU database from BACC 2.6.2.7 to BAC 4.0. Migrating involves two distinct phases:

1. Phase 1—This phase is performed after BAC is installed and is executed via the **migrateDb.sh** tool.
2. Phase 2—This phase is executed when the RDU is first started up after the first phase of migration is complete.

The migration script (**migrateDb.sh**) is automatically installed when you run the BAC 4.0 installation program (**pkgadd**). Migration is accomplished by reading from the original database and writing it into a new database. For this purpose, you must allocate additional disk space for accommodating the newly created database.

The status of the first phase of migration is recorded in a migration log file, which is stored in the migrated database directory. The *migration.log* file identifies the version of the database that is being migrated and provides status messages for the migration process.

**Note**

Migration deletes any outstanding jobs stored in the database, such as reliable batches that did not finish execution or pending Configuration Regeneration Service (CRS) jobs.

### Backwards Compatibility

You can use the 4.0 RDU with a migrated database to operate with earlier versions of Solaris DPEs and Network Registrar servers for gradual online migration.

Migration preserves the device record revision numbers used in DPE synchronization. As a result, DPE repopulation is not triggered after the RDU database upgrade, ensuring the least disruption until you upgrade the specific DPE.

**Note**

This BAC release provides multivendor support via Option 43 and its suboptions. When using this option, ensure that you modify templates used in earlier releases to be compatible with the template grammar that BAC 4.0 uses.

**Migration Performance**

A large BAC RDU database can be several gigabytes in size, and may take an extended length of time to migrate. The length of time that database migration takes depends largely on your hardware. Using faster disks improves the time significantly.

Migration automatically compacts your database that may be fragmented. However, this BAC release stores additional data for every device. You can expect the size of the database to increase after migration by as much as 10 percent.

The migration process is optimized for speed and database compactness. As a result, migration requires a large amount of process heap size (memory). For example, migrating a 7-million device database requires approximately 1,024 MB of process heap size. Because the migration process is limited to 4 GB of heap space, migration is effectively limited to a database size of approximately 25-30 million devices.

The **-Xmx** parameter in the **migrateDb.sh** script determines the maximum process heap size for migration. The default setting of 3,072 MB for this parameter is sufficient for migrating a 20-million device database. You may need to fine-tune this setting to suit your environment. For example, to migrate smaller databases running on low-end systems with less memory, you can reduce the value of the maximum heap size setting. For databases that exceed the maximum supported scale, you may need to increase this setting.

To change the heap size parameter, in the **migrateDb.sh** script edit the value for the **-Xmx** parameter.

**Licensing After Migration**

The licensing scheme changes significantly in this release. You cannot use the license keys from earlier versions of BAC to provision your network using BAC 4.0. Any existing license keys are automatically deleted during database migration. To configure BAC licensing, you must obtain the license files via a license claim process and install them using the administrator user interface. For details, see the *Release Notes for Broadband Access Center 4.0*.

During migration, device counters are recalculated based on the number of devices in each provisioning group found in the database. New counters are recorded in the new database and used for licensing.

**RDU Extension Migration**

During database migration, custom extensions are reset to 4.0 defaults. Custom extensions must be updated to operate in the 4.0 environment. If you require custom extensions after migration, you must add them using the administrator user interface. For details, refer to the *Cisco Broadband Access Center Administrator Guide 4.0*.

**Migration of Duplicate Class of Service and Node Name**

This BAC release does not support duplicate names across technologies for Class of Service and nodes. If BAC detects duplicate names during database migration, the duplicate entries are automatically renamed in the following format:

- Class of Service—{*Technology\_Name*}\_{*Original\_ClassOfService\_Name*}
- Nodes—{*Node\_Type*}\_{*Node\_Name*}

For example, if BAC encounters a **gold** Class of Service for a computer and a DOCSIS modem, either the computer Class of Service is renamed **Computer\_gold** or the DOCSIS modem Class of Service is renamed **DOCSISModem\_gold**. The appropriate warnings are issued to the console and migration log, and all properties containing the specific Class of Service value are automatically updated.

## Verifying Database Integrity

We recommend that you perform a dry run of the migration process on a staging (nonproduction) system, instead of on a live system during RDU downtime. These steps may not be practical during live migration, because in the case of a large database, verification can take an extended length of time.

To verify the database:

- Before migration, run the **verifyDb.sh** tool on a backup snapshot.



**Note** To verify the database before migration, use the **verifyDb.sh** tool from the BAC installation corresponding to the version of the database. You cannot verify a nonmigrated database with the BAC 4.0 version of **verifyDb.sh**.

For example, enter:

```
# /opt/CSCObpr/rdu/internal/db/bin/verifyDb.sh -dbdir /disk1/backup
```

This pathname is specific to the BAC installation version before migration.

- After migration, run the **verifyDb.sh** tool on the migrated database.

For example, enter:

```
# /opt/CSCObac/rdu/internal/db/bin/verifyDb.sh -dbdir /disk2/target
```

For details on the **verifyDb.sh** tool, refer to the *Cisco Broadband Access Center Administrator Guide 4.0*.

## RDU Migration Workflow

Migrating the RDU database consists of two phases:

1. Phase 1—This phase is executed after installation via the **migrateDb.sh** tool.
2. Phase 2—This phase is executed when the RDU is first started up after the first phase of migration is complete.


Table 5-2 describes the process of migration using examples that assume that:

- BAC is installed in the default home directory (*/opt/CSCObac*).
- The backup of the previous version of the RDU database is located in the */disk1/backup* directory.

**Table 5-2 RDU Migration Workflow**

|        | Task                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Refer to...                                                  |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Step 1 | <p>Select two disk partitions: one for the migrated database, and another as a temporary storage directory for the database transaction logs.</p> <p><b>Note</b> For performance reasons, we recommend that you configure these disks on a fast I/O system, such as a RAID array with battery-backup write cache or a RAM disk. For details on migrating using a RAM disk, see <a href="#">Migrating Using a RAM Disk, page 5-13</a>.</p> <p>The partitions that are used in the examples in this procedure are:</p> <ul style="list-style-type: none"> <li>• Volume <i>/disk2/target</i>—Used to write the migrated database data.</li> </ul> <p>The available disk space for the migrated database should be at least 120 percent of the size of the original database (which is the <i>bpr.db</i> file in the backup directory).</p> <ul style="list-style-type: none"> <li>• Volume <i>/disk3/target</i>—Used as the temporary storage directory.</li> </ul> <p>The available space on the temporary storage disk must be at least 2 GB. For performance reasons, however, we recommend that you locate this directory on a different disk from the backup database and the target database location.</p>                                                                                                                                                                                                                                                                                 | Solaris documentation                                        |
| Step 2 | <p>Run the <b>migrateDb.sh</b> tool on the backed-up database. The <b>migrateDb.sh</b> script resides in the <i>BPR_HOME/migration</i> directory. For a description of all arguments that this tool supports, see <a href="#">Using the migrateDb.sh Tool, page 5-10</a>.</p> <p>For example:</p> <pre># /opt/CSCObac/migration/migrateDb.sh -dbdir /disk1/backup -targetdbdir /disk2/target -targetdblogdir /disk3/target &amp;&gt; /var/run/migration-console.log &amp;</pre> <ul style="list-style-type: none"> <li>• <b>-dbdir</b>—Specifies the location of the database backup that is to be migrated; in this case, <i>/disk1/backup</i>.</li> <li>• <b>-targetdbdir</b>—Specifies the target location where the migrated database should be placed; in this case, <i>/disk2/target</i>. This directory is created automatically during migration and must not exist before the script is executed.</li> <li>• <b>-targetdblogdir</b>—Specifies the target location for the temporary migration transaction log files; in this case, <i>/disk3/target</i>. This directory is created automatically during migration and must not exist before the script is executed.</li> </ul> <p><b>Note</b> New database log files are created in this directory and later destroyed automatically during migration. Once migration is complete, all the necessary files are automatically copied from this directory to <i>/disk2/target</i>. After migration, you can delete this directory.</p> | <i>Cisco Broadband Access Center Administrator Guide 4.0</i> |

Table 5-2 RDU Migration Workflow (continued)

|        | Task                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Refer to...                                                  |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Step 3 | <p>Observe the migration progress using the <i>migration.log</i> file.</p> <p>For example:</p> <pre># tail -f /disk2/target/migration.log</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Solaris documentation                                        |
| Step 4 | <p>Verify if the migration is complete using the <i>migration.log</i> file. If you find any warnings or notices, use the <b>grep</b> command-line tool.</p> <p>For example:</p> <pre># tail /disk2/target/migration.log ... Tue Oct 16 15:36:20 EDT 2007: Phase 1 of RDU database migration to BAC 4.0 completed with 1 warning(s) and 2 notice(s).  # cat migration.log   grep "WARNING"  Tue Oct 16 15:57:23 EDT 2007: WARNING: Duplicate Class of Service name [cg814wg_chn_n05] detected for [CableHomeWanMan] technology. Class of Service object was renamed to [CableHomeWanMan_cg814wg_chn_n05].  # cat migration.log   grep "NOTICE"  Tue Oct 16 19:06:23 EDT 2007: NOTICE: A deprecated property [/dhcp/client-policy/response/boot-file] was found on object with oid [2882304375712137210]. Property will be declared as custom property.</pre> <p> <b>Tip</b> You may also find it useful to examine the device statistics printed at the end of the <i>migration.log</i> file.</p> | Solaris documentation                                        |
| Step 5 | <p>Restore the migrated database into the target directories for the 4.0 RDU. This process copies the migrated database to the RDU <i>BPR_DATA</i> and <i>BPR_DBLOG</i> directories.</p> <p>For example:</p> <pre># /opt/CSCObac/rdu/bin/restoreDb.sh /disk2/target</pre> <p><b>Note</b> Once the migration process is complete, you can delete the content of <i>/disk2/target</i> and <i>/disk3/target</i> directories.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <i>Cisco Broadband Access Center Administrator Guide 4.0</i> |
| Step 6 | <p>Start the RDU process from the BAC watchdog process command line, and look for messages on successful initialization in the <i>rdu.log</i> file.</p> <p>For example:</p> <pre># /etc/init.d/bprAgent start rdu</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <i>Cisco Broadband Access Center Administrator Guide 4.0</i> |
| Step 7 | <p>Verify if the second phase of migration has started.</p> <p>For example, <i>rdu.log</i> should include similar messages:</p> <pre>bac-test.example.com: 2007 10 17 02:36:28 EDT: %BAC-RDU-6-0695: [Starting Phase 2 of RDU db migration].</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Solaris documentation                                        |

**Table 5-2 RDU Migration Workflow (continued)**

|                | Task                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Refer to...                                                  |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| <b>Step 8</b>  | <p>Observe the progress of the migration.</p> <p>For example, <i>rdu.log</i> should include similar messages:</p> <pre> bac-test.example.com: 2007 10 10 02:50:36 EDT: %BAC-RDU-6-0695: [Progress report for selection process...].  bac-test.example.com: 2007 10 10 02:50:36 EDT: %BAC-RDU-6-0695: [Selection process stats: Read a total of 400000 DOCSISModem device records].  bac-test.example.com: 2007 10 10 02:50:36 EDT: %BAC-RDU-6-0695: [Selection process stats: Read a total of 400000 device records].  bac-test.example.com: 2007 10 10 02:50:36 EDT: %BAC-RDU-6-0695: [Selection process stats: Ran selection on 398228 eligible devices]. </pre> | Solaris documentation                                        |
| <b>Step 9</b>  | <p>Verify if the second phase of migration is complete.</p> <p>For example, <i>rdu.log</i> should include a similar message:</p> <pre> bac-test.example.com: 2007 10 17 03:28:58 EDT: %BAC-RDU-6-0695: [Completed Phase 2 of RDU db migration].  bac-test.example.com: 2007 10 17 03:28:58 EDT: %BAC-RDU-6-0695: [RDU db migration has been finalized]. </pre> <p>Also, you can check if the <i>BPR_DATA/rdu/DB_VERSION</i> file indicates the database version as 4.0.</p>                                                                                                                                                                                        | <i>Cisco Broadband Access Center Administrator Guide 4.0</i> |
|                | <p><b>Note</b> Migration preserves the device record revision numbers used in DPE synchronization. As a result, DPE repopulation is not triggered after the RDU database upgrade, ensuring the least disruption until you upgrade the specific DPE.</p>                                                                                                                                                                                                                                                                                                                                                                                                            |                                                              |
| <b>Step 10</b> | <p>Verify the RDU operations by logging in to the administrator user interface. From <b>Servers &gt; RDU</b>, you can check the RDU version and device count statistics.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <i>Cisco Broadband Access Center Administrator Guide 4.0</i> |

## Using the migrateDb.sh Tool

Table 5-3 describes the arguments that you can use with the **migrateDb.sh** tool.

**Table 5-3 Arguments for migrateDb.sh Tool**

| Argument             | Description                                                          | Required | Optional | Default                                        |
|----------------------|----------------------------------------------------------------------|----------|----------|------------------------------------------------|
| -dbdir <i>dir</i>    | Specifies the location of the database backup that is to be migrated | ✓        |          | None                                           |
| -dblogdir <i>dir</i> | Specifies the location of the database logs that are to be migrated  |          | ✓        | The directory that the -dbdir option specifies |

**Table 5-3 Arguments for migrateDb.sh Tool (continued)**

| Argument                   | Description                                                                                                                                                                                                                                                                                                                                                                                                         | Required | Optional | Default |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|---------|
| -targetdbdir <i>dir</i>    | Specifies the target location where the migrated database will be placed                                                                                                                                                                                                                                                                                                                                            | ✓        |          | None    |
| -targetdblogdir <i>dir</i> | Specifies the target location in which the migrated database transaction log files are stored temporarily during migration                                                                                                                                                                                                                                                                                          | ✓        |          | None    |
| -cachesize <i>value</i>    | Specifies, in MB, the size of the memory cache.<br><br>This parameter is optional. If you use this parameter, you must not exceed the 100-MB limit, unless you reduce the value of the <b>-Xmx</b> variable in the migrateDb.sh script by double the increase in the cache size. For example, if you set cache size to 200 MB, you must reduce the value of <b>-Xmx</b> thus:<br>$(200-100)*2 = 200$ MB             |          | ✓        | 100 MB  |
| -cmtsv <i>value</i>        | Specifies the CMTS DOCSIS version that is to be used during service selection. The service is selected based on the minimum version that the CMTS and the cable modem supports. The DOCSIS version that the cable modem supports is determined by the value of the <b>dhcp-client-identifier</b> option. The acceptable values are: <ul style="list-style-type: none"> <li>1.0</li> <li>1.1</li> <li>2.0</li> </ul> |          | ✓        | 1.1     |
| -help                      | Specifies usage for the tool                                                                                                                                                                                                                                                                                                                                                                                        |          | ✓        | None    |

**Table 5-3 Arguments for migrateDb.sh Tool (continued)**

| Argument | Description | Required | Optional | Default |
|----------|-------------|----------|----------|---------|
|----------|-------------|----------|----------|---------|

You can use a number of arguments, as described in the following section, to specify the Class of Service and DHCP Criteria for promiscuous devices. These arguments are optional, provided the default objects, as specified here, exist in the database. The first phase of migration uses these objects to select the service for the devices granted promiscuous access.

During the second phase of migration, the standard selection process for each device is performed according to the policies found in the RDU database. Any discrepancies are addressed in favor of the configuration found in the database. However, the migration process is most efficient if few discrepancies are encountered.



**Tip** While it may not be possible for you to specify these policy objects accurately if devices of the same type use different promiscuous policy objects, migration will be more efficient if you specify the most frequently used promiscuous objects.

|                        |                                                                                                            |  |   |                                  |
|------------------------|------------------------------------------------------------------------------------------------------------|--|---|----------------------------------|
| -pcospc <i>value</i>   | Specifies the name of the most frequently used Class of Service for promiscuous computers                  |  | ✓ | unprovisioned-computer           |
| -pcosmta <i>value</i>  | Specifies the name of the most frequently used Class of Service for promiscuous MTAs                       |  | ✓ | unprovisioned-packet-cable-mta   |
| -pcoschwd <i>value</i> | Specifies the name of the most frequently used Class of Service for promiscuous CableHome WAN-Data devices |  | ✓ | unprovisioned-cablehome-wan-data |
| -pcoschwm <i>value</i> | Specifies the name of the most frequently used Class of Service for promiscuous CableHome WAN-MAN devices  |  | ✓ | unprovisioned-cablehome-wan-man  |
| -pcoscpe <i>value</i>  | Specifies the name of the most frequently used Class of Service for promiscuous custom CPE                 |  | ✓ | unprovisioned-customcpe          |
| -pdcp <i>value</i>     | Specifies the name of the most frequently used DHCP Criteria for promiscuous computers                     |  | ✓ | genericCPE                       |
| -pdcmta <i>value</i>   | Specifies the name of the most frequently used DHCP Criteria for promiscuous MTAs                          |  | ✓ | genericCPE                       |
| -pdcchwd <i>value</i>  | Specifies the name of the most frequently used DHCP Criteria for promiscuous CableHome WAN-Data devices    |  | ✓ | genericCPE                       |



**Table 5-3** Arguments for *migrateDb.sh* Tool (continued)

| Argument              | Description                                                                                            | Required | Optional | Default    |
|-----------------------|--------------------------------------------------------------------------------------------------------|----------|----------|------------|
| -pdcchwm <i>value</i> | Specifies the name of the most frequently used DHCP Criteria for promiscuous CableHome WAN-MAN devices |          | ✓        | genericCPE |
| -pdccke <i>value</i>  | Specifies the name of the most frequently used DHCP Criteria for promiscuous custom CPE                |          | ✓        | genericCPE |

## Migrating Using a RAM Disk

The RAM disk is a Solaris feature that allows you to mount a portion of the RAM as a disk volume. Disk I/O operations on such volumes are considerably faster and can be useful when you have large databases on systems with sufficient memory.

The procedures described in this section are optional and describe how to create and use different RAM disks to migrate your database instead of a regular disk volume, such as a fast RAID array with battery-backed write cache:

- [Creating RAM Disk Volumes for Migration, page 5-14](#)
- [Using the RAM Disk Volumes for Migration, page 5-15](#)

## Creating RAM Disk Volumes for Migration

The following procedure creates three volumes for migration and assumes that the size of the original database is 9 GB. Adjust the volume sizes as required for your database and according to what the available memory permits.

Using the following procedure, you can create three RAM disks that you could use for migration:

- */ram-disk1*—To contain the source database
- */ram-disk2*—To contain the migrated database directory
- */ram-disk3*—To contain the temporary migration transaction logs

**Step 1** Ensure that enough memory is allocated to the RAM disk in the */etc/system* file. This figure is a percentage of the total RAM on the system. Assuming a 64-GB RAM, this setting dedicates 32 GB to the RAM disk.

For example:

```
# less /etc/system
...
set ramdisk:rd_percent_physmem=50
```



**Note** If you also set the **segmap\_percent** parameter, which determines the quantity of memory allocated to the OS I/O buffer cache, make sure that there is sufficient memory for both settings and some space is left for the OS operation.

**Step 2** Reboot the system.

For example:

```
# shutdown -i6 -g0 -y
```

**Step 3** Create three RAM volumes.

For example:

```
# ramdiskadm -a volume1 10g
# ramdiskadm -a volume2 12g
# ramdiskadm -a volume3 2g
```

**Step 4** Create new file systems on each volume.

For example:

```
# newfs /dev/ramdisk/volume1
# newfs /dev/ramdisk/volume2
# newfs /dev/ramdisk/volume3
```

**Step 5** Mount the volumes.

For example:

```
# rmdir /ram-disk1
# rmdir /ram-disk2
# rmdir /ram-disk3
```

```
# mkdir /ram-disk1
# mkdir /ram-disk2
# mkdir /ram-disk3

# mount /dev/ramdisk/volume1 /ram-disk1
# mount /dev/ramdisk/volume2 /ram-disk2
# mount /dev/ramdisk/volume3 /ram-disk3
```

**Step 6** Verify the mount points and their size.

For example:

```
# df -kh
```

## Using the RAM Disk Volumes for Migration

To use the RAM-disk volumes that you have created for migration:

**Step 1** Copy the backup of your database to */ram-disk1*.

For example:

```
# mkdir /ram-disk1/backup
# cp /disk1/backup/* /ram-disk1/backup/.
```

**Step 2** Perform the first phase of migration according to the procedure that [Table 5-2](#) describes. Remember to use a command similar to the one described here instead of the one mentioned in Step 2 of the table.

For example:

```
# /opt/CSCObac/migration/migrateDb.sh -dbdir /ram-disk1/backup
-targetdbdir /ram-disk2/target -targetdblogdir /ram-disk3/target
&> /var/run/migration-console.log &
```

**Step 3** To ensure that the second phase of migration is executed with the database of the RAM disk:

- a. Install the 4.0 RDU such that the database directory and the database logs directory (defined by the *BPR\_DATA* and *BPR\_DBLOG* variables, respectively) point to the volumes on the RAM disk.
- b. After the second phase of migration is complete, stop the BAC process watchdog, using the */etc/init.d/bprAgent stop* command from the BAC process watchdog command line.
- c. Back up the database using:

```
BPR_HOME/rdu/bin/backupDb.sh -nosubdir /ram-diskX/migrated-db/
```

- *BPR\_HOME*—Specifies the home directory, which is by default */opt/CSCObac*.
- *X*—Specifies the RAM disk to which the RDU database is migrated.

- d. Edit the *bpr\_definitions.sh* file that is found in the home directory (by default */opt/CSCObac*) and change the *BPR\_DATA* and *BPR\_DBLOG* locations to new directories located on permanent storage drives.

- e. Recover and restore the database to the new RDU locations. Run the **recoverDb.sh** and the **restoreDb.sh** scripts, respectively, using:

***BPR\_HOME*/rdu/bin/recoverDb.sh**

where *BPR\_HOME* specifies the home directory, which is by default */opt/CSCObac*.

***BPR\_HOME*/rdu/bin/restoreDb.sh /ram-diskX/migrated-db/**

- *BPR\_HOME*—Specifies the home directory, which is by default */opt/CSCObac*.
- *X*—Specifies the RAM disk to which the RDU database is migrated.

For details on using these scripts, refer to the *Cisco Broadband Access Center Administrator Guide 4.0*.

- f. Start the process watchdog, by running the **/etc/init.d/bprAgent start** command.
-



## CHAPTER 6

# Setting Up a Device Provisioning Engine

---

This chapter describes how you set up the Cisco Broadband Access Center (BAC) Device Provisioning Engine (DPE).

A DPE 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.

To configure the DPE from the CLI, you must have a valid license. If you run the commands described in this chapter on an unlicensed DPE, the following message appears:

```
This DPE is not licensed. Your request cannot be serviced. Please check with your
system administrator for DPE licenses.
```

For details on DPE licensing and how to install your license, see [Licensing BAC, page 4-1](#).

This chapter describes:

- [Accessing the DPE CLI, page 6-1](#)
- [Logging In, page 6-2](#)
- [Configuring a DPE for Data, page 6-3](#)
- [Configuring a DPE for Voice Technology, page 6-5](#)

## Accessing the DPE CLI

You can access the CLI of a DPE in one of two ways: from a local or remote host.

### Accessing from a Local Host

To access the CLI from a local host, use:

```
# telnet localhost 2323
```

or

```
# telnet 0 2323
```

## Accessing from a Remote Host

To access the CLI from a remote host, enter:

```
# telnet remote-hostname 2323
```

**Note**

If you cannot establish a Telnet connection to the CLI, the CLI server is probably not running. You may need to start the server. To start the server, enter:

```
# /etc/init.d/bprAgent start cli
```

## Logging In

To log in to the DPE:

- Step 1** At the password prompt, enter the login password. The default user password is **changeme**.

For example:

```
Broadband Access Center 4.0 (SOL_BAC4_0_0_00000000_0000)
Device Provisioning Engine local_bac_dpe
```

```
User Access Verification
```

```
Password: <changeme>
```

```
bac_dpe>
```

For security reasons, we recommend that you change the original password.

- Step 2** Enter the **enable** command to enter privileged mode. You must be working in privileged mode to configure the DPE.

For example:

```
bac_dpe> enable
```

- Step 3** The system prompts you for the password to access the privileged mode. At the prompt, enter the password; the default is **changeme**.

The system displays the privileged mode prompt.

For example:

```
bac_dpe> enable
Password: <changeme>
bac_dpe#
```

- Step 4** Change your login and privileged mode passwords.

- a.** To change the login password:

1. Access the DPE in the privileged mode. See [Step 2](#).
2. At the prompt, enter the **password** command.

For example:

```
bac_dpe# password
```

- At the password prompt, enter the new password, then re-enter it.

For example:

```
New password: <password1>
Retype new password: <password1>
Password changed successfully.
```

- To change the privileged mode password:

- Access the DPE in the privileged mode. See [Step 2](#).
- At the prompt, enter the **enable password** command.

For example:

```
bac_dpe# enable password
```

- At the password prompt, enter the new password, then re-enter it.

For example:

```
New enable password: <password2>
Retype new enable password: <password2>
Password changed successfully.
```

## Configuring a DPE for Data

To configure a DPE, you must know the:

- IP address or fully qualified domain name (FQDN) of the RDU for the DPE.
- Provisioning group or groups to which the DPE belongs.



### Tip

You can use the **show run** command to view the running configuration. A complete list of commands is available through the use of the **show commands** command. For additional information, refer to the *Cisco Broadband Access Center DPE CLI Reference, 4.0*.

To configure a DPE:

### Step 1

Configure the DPE interface to handle provisioning requests, by specifying the IP address of the interface in the IPv4 or the IPv6 addressing formats.

For example:

Using IPv4 format:

```
bac_dpe# interface ip 10.10.10.133 provisioning
% OK (Requires DPE restart "> dpe reload")
```

Using IPv6 format:

```
bac_dpe# interface ip 2001:0DB8:0:0:203:baff:fe12:d5ea provisioning
% OK (Requires DPE restart "> dpe reload")
```



### Note

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

- Step 2** Configure the DPE to use the specified interface, when communicating with Network Registrar extensions.

For example:

```
bac_dpe# interface ip 10.10.10.133 pg-communication
% OK (Requires DPE restart "> dpe reload")
```



---

**Note** You can configure only IPv4 interfaces for communication with Network Registrar extensions.

---

- Step 3** Enter the IP address for the RDU or its domain name if you are implementing DNS. Also, identify the port on which the RDU is listening. The default listening port is 49187.

For example:

```
bac_dpe# dpe rdu-server 10.10.10.1 49187
% OK (Requires appliance restart "> reload")
```

- Step 4** Specify the provisioning group or groups of which the DPE is part. Where appropriate, specify the secondary provisioning group of which the DPE is a member.

For example:

```
bac_dpe# dpe provisioning-group primary group1
% OK (Requires appliance restart "> reload")
bac_dpe# dpe provisioning-group secondary group2
% OK (Requires appliance restart "> reload")
```

- Step 5** Set the shared secret password to be the same as that on the RDU.

For example:

```
bac_dpe# dpe shared-secret secret
% OK (Requires DPE restart "> dpe reload")
```

- Step 6** Enable the TFTP service running on the DPE for IPv4.

For example:

```
bac_dpe# service tftp 1 ipv4 enabled true
% OK (Requires DPE restart "> dpe reload")
```

- Step 7** Enable the Time of Day (ToD) service running on the DPE for IPv4.

For example:

```
bac_dpe# service tod 1 ipv4 enabled true
% OK (Requires DPE restart "> dpe reload")
```

- Step 8** For the configuration to take effect, you must reload the DPE.

For example:

```
bac_dpe# dpe reload
dpe has been restarted
```

After you reload the DPE, you can establish a Telnet session to the DPE using its IP address. Remember to use the new login and enable password that you created in [Logging In, page 6-2](#).

---



# Configuring a DPE for Voice Technology

This section describes the configuration tasks that you must perform to set up a DPE to support voice technology.

The tips provided in this section refer to the *dpe.properties* file, located in the *BPR\_HOME/dpe/conf* directory. You change the properties specified, as indicated in the tips, to enable the described feature. If you edit the properties, you must restart the DPE.



## Caution

In the *dpe.properties* file, there should be only one instance of each property described in these tips.

## Setting Up Voice Technology

To set up voice technology on your DPE:

- Step 1** To set the FQDN for each enabled DPE interface in the IPv4 or IPv6 format, enter:

**interface ip *ip\_address* provisioning fqdn *fqdn***



## Tip

*dpe.properties*: /server/provFQDNs=*FQDN*[*IP address*]:*port*. This could translate, for example, into c3po.penet.cisco.com[10.10.10.5]:49186.

The FQDN is sent as the SNMPEntity in DHCP option 177 suboption 3.

For example:

Using the IPv4 format:

```
bac_dpe# interface ip 10.10.1.2 provisioning fqdn dpe.example.com
% OK (Requires DPE restart "> dpe reload")
```

Using the IPv6 format:

```
bac_dpe# interface ip 2001:0DB8:0:0:203:baff:fe12:d5ea provisioning fqdn dpe.example.com
% OK (Requires DPE restart "> dpe reload")
```

- Step 2** To configure voice technology at DPE, enter:

**service packetcable 1..1 registration kdc-service-key *password***



## Note

The DPE password that you enter by using this CLI command must match the corresponding password used in the KeyGen utility when generating service keys for the KDC.



## Tip

*dpe.properties*: /pktcbl/regsvr/KDCServiceKey=(*xx*: ... *xx*)  
where (*xx*: ... *xx*) represents a 24-byte randomly selected, colon-separated, hexadecimal value;  
for example: 31:32:33:34:35:36:37:38:39:30:31:32:33:34:3 5:36:37:38:39:30:31:32:33:34.

For example:

```
bac_dpe# service packetcable 1 registration kdc-service-key password3
% OK (Requires DPE restart "> dpe reload")
```

**Step 3** To control the choice of encryption algorithm for use during SNMPv3, enter:

**service packetcable 1..1 registration policy-privacy *value***

If you enter a value of zero (which is the default value) for this policy privacy, the MTA will choose a privacy option for SNMPv3. Entering any nonzero value means the Provisioning Server will set its privacy option in SNMPv3 to a specific protocol. Although, currently, DES is the only privacy option supported by voice technology.



**Tip**

---

dpe.properties: /pktcbl/regsvr/policyPrivacy=1 (enables DES privacy)

---

For example:

```
bac_dpe# service packetcable 1 registration policy-privacy 1
% OK (Requires DPE restart "> dpe reload">
```

**Step 4** Enter this command to set the SNMP service key used for SNMPv3 cloning to the RDU.

```
service packetcable 1..1 snmp key-material password
```

The default value for this command is **null**. Enter this default to disable SNMPv3 cloning on this DPE.



**Caution**

To enable SNMP cloning, set this property to the identical 46 hexadecimal bytes that are used at the RDU (*rdu.properties* file, which resides in the */BPR\_HOME/rdu/conf* directory).



**Tip**

dpe.properties: to turn SNMPv3 cloning off, use `/pktcbl/snmp/keyMaterial=` ; to turn it on, use `/pktcbl/snmp/keyMaterial=key`. For example, `/pktcbl/snmp/keyMaterial=31:32:33:34:35:36:37:38:39:30:31:32:33:34:35:36:37:38:39:30:31:32:33:34:35:36:37:38:39:30:31:32:33:34:35:36:37:38:39:30:31:32:33:34:35:36`

For example:

```
bac_dpe# service packetcable 1 snmp key-material password4
% OK (Requires DPE restart "> dpe reload")
```

**Step 5** Enter this command to enable the PacketCable voice technology.

```
service packetcable 1..1 enable true
```

You can disable voice technology by entering **service packetcable 1..1 enable false**.



**Tip**

dpe.properties: `/pktcbl/enable=enabled`

For example:

```
bac_dpe# service packetcable 1 enable true
% OK (Requires DPE restart "> dpe reload")
```

**Step 6** Run the **dpe reload** command.

For example:

```
bac_dpe# dpe reload
dpe has been restarted
```

## Controls Available

The commands described in this section provide additional configuration settings.

- **service packetcable 1..1 registration encryption enable**—This command optionally enables encryption of the MTA configuration file.



**Tip**

dpe.properties: `/pktcbl/regsvr/configEncrypt=1`

- **no service packetcable 1..1 registration encryption enable**—This command optionally disables encryption of the MTA configuration file.

**Tip**

---

`dpe.properties: /pktcbl/regsvr/configEncrypt=0`

---

- **service packetcable 1..1 snmp timeout *timeout***—This command dynamically sets the number of seconds that the DPE waits for a response to an SNMPv3 SET operation. The timeout is expressed in seconds and the default value is 10 seconds.

**Tip**

---

`dpe.properties: /pktcbl/snmp/timeout=1 and /pktcbl/snmp/timeout=10`

---



## CHAPTER 7

# Uninstalling Broadband Access Center

---

This chapter describes how you can uninstall Cisco Broadband Access Center (BAC).

The procedure described in this chapter uninstalls the RDU, Cisco Network Registrar extensions, the DPE, and the KDC, but it does not uninstall the Network Registrar application. Before removing BAC you must manually remove the BAC configuration on Network Registrar.

The uninstallation program removes all files found in the installation directory (the default directory is */opt/CSCObac*). The program also shuts down and removes these processes, if they are detected: RDU, KDC, SNMP Agent, Tomcat, BAC agent, and DPE.

The uninstallation program does not remove files that were placed outside the installation directory. For example, a component installation places the database and database logs directories under */var/CSCObac*. These files must be removed manually. (Subsequent sections describe how to delete these files.) Also, the program does not remove any files found in the Network Registrar directory.

If you have installed BAC extensions on Network Registrar, you must uninstall those extensions to completely uninstall the BAC program; otherwise, an error message similar to the following appears:

```
The uninstall program found a copy of the BAC extensions in the NR extension
directory(/opt/nwreg2/local/extensions/dhcp/dex/libbprextensions.so), please disable
the extensions and remove the library before uninstalling BAC.
```



---

**Note** The path to the Network Registrar extensions differs based on the location where you have installed Network Registrar; the default location is */opt/nwreg2*.

---

If the uninstallation program fails to uninstall BAC, error messages appear.

This chapter describes:

- [Uninstalling BAC, page 7-1](#)
- [Post-Uninstallation Task, page 7-2](#)

## Uninstalling BAC

This section describes the procedures to uninstall BAC.

After uninstalling BAC, manually remove the data and database logs directories. See [Post-Uninstallation Task, page 7-2](#).

To uninstall BAC from the command line:

- 
- Step 1** Log in as *root*.
- Step 2** Manually remove the configuration of the BAC extensions on the Network Registrar server. You can do this from any server that has **nrcmd** installed and connectivity with Network Registrar.
- To uninstall the BAC extensions from your Network Registrar configuration, enter:
 

```
# NR_HOME/local/usrbin/nrcmd -N admin -P changeme -b <
BPR_HOME/cnr_ep/bin/bpr_cnr_disable_extpts.nrcmd
```
  - To reload your DHCP server, enter:
 

```
# /etc/init.d/nwreglocal stop
# /etc/init.d/nwreglocal start
```

Alternatively, enter:

```
# NR_HOME/local/usrbin/nrcmd -N admin -P changeme "dhcp reload"
```
  - To remove the BAC extensions from the Network Registrar extensions directory, enter:
 

```
# rm -f NR_HOME/local/extensions/dhcp/dex/libbprextensions.so
```
- Step 3** At the CLI prompt, enter:
- ```
# pkgrm CSCObac
```
- The following information appears:
- The following package is currently installed:
- ```
CSCObac          Cisco BAC product
                  (sparc) 4.0.
```
- Do you want to remove this package? [y,n,?,q] y
- Step 4** Enter **y**, and press **Enter** to start uninstalling.
- The program again prompts you to confirm uninstalling because the uninstallation program runs on superuser (root) permission.
- Step 5** Enter **y** and press **Enter**.
- When uninstalling is complete, the following message appears:
- ```
Removal of <CSCObac> was successful.
```
- 

## Post-Uninstallation Task

After you have uninstalled BAC, you must manually remove the data and database logs directories. To remove these directories:

- 
- Step 1** Log in as *root*.
- Step 2** Remove the data and the database logs directories. (The default directory for both is */var/CSCObac*.)
- For example, enter:
- ```
# rm -rf /var/CSCObac
```

The data and the database logs directories are deleted.

---







## APPENDIX **A**

# Network Registrar Configuration File Example

---

This appendix describes the sample configuration file included with this installation of Cisco Broadband Access Center (BAC). This file is typical of the files you use during the BAC installation.

You can copy and use the sample configuration scripts to work with your BAC implementation. One script exists for DOCSIS modems and computers, while another script is available for DOCSIS modems and PacketCable MTAs.

## Sample Script for DOCSIS Modems and Computers

The 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 the `BPR_HOME/cnr_ep/samples` directory.

To create this script, assume that the:

- DHCP primary server IP address is: 192.168.0.32
- DNS primary server IP address is: 192.168.0.32

This sample script defines:

- 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.
- Disabled TFTP server.

To run this script, in the Cisco Network Registrar `nrcmd` program, enter:

```
# NR_HOME/local/usrbin/nrcmd -N username -P password -b < bpr_cnr_hsd_sample_config.nrcmd
```

- `username`—Identifies the username.
- `password`—Identifies the password.

# Sample Script for DOCSIS Modems and PacketCable MTAs

This sample configuration `nrcmd` script (`bpr_cnr_pktcbl_sample_config.nrcmd`) is used for a high-speed data deployment of DOCSIS modems and PacketCable MTAs. A multiple-host configuration with failover protection is also used, and the script is installed in the `BPR_HOME/cnr_ep/samples` directory.

To create this script, assume that the:

- DHCP primary server IP address is: 192.168.0.32
- DNS primary server IP address is: 192.168.0.32

This sample script defines objects similar to those described in [Sample Script for DOCSIS Modems and Computers, page A-1](#).

To run this script, in the Network Registrar `nrcmd` program, enter:

```
# NR_HOME/local/usrbin/nrcmd -N username -P password -b <
bpr_cnr_pktcbl_sample_config.nrcmd
```

- `username`—Identifies the username.
- `password`—Identifies the password.



# APPENDIX **B**

## Installation Worksheet

During the installation of Cisco Broadband Access Center (BAC), you are prompted for configuration information. [Table B-1](#) is a worksheet that you can use to record the information specific to your installation.

**Table B-1**      **BAC Installation Parameters**

| Prompt                                                           | Description                                                                                | Default Value       | Your Value |
|------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------|------------|
| Home directory                                                   | Root directory to install BAC component                                                    | <i>/opt/CSCObac</i> |            |
| Data directory                                                   | Root directory to install the data directory for BAC component                             | <i>/var/CSCObac</i> |            |
| Database logs directory                                          | Root directory to install the database transaction logs for BAC component                  | <i>/var/CSCObac</i> |            |
| Logs directory                                                   | Root directory to install the general transaction logs for BAC components                  | <i>/var/CSCObac</i> |            |
| RDU host                                                         | Hostname of the server on which the RDU is installed                                       | None                |            |
| RDU port number                                                  | Port number through which the RDU communicates with other BAC components                   | 49187               |            |
| Cisco Network Registrar extension points provisioning group name | Name of the provisioning group for Network Registrar extensions                            | None                |            |
| KDC realm name                                                   | Name of the Kerberos realm required by the KDC component                                   | None                |            |
| KDC service key                                                  | Service key that the KDC server uses for communication with the provisioning FQDNs of DPEs | None                |            |

**Table B-1** BAC Installation Parameters (continued)

| Prompt                                      | Description                                                                                                                                                                                                                                              | Default Value | Your Value |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------|
| Response file                               | Name and location of the response file that you generate to install these components during a noninteractive installation: <ul style="list-style-type: none"> <li>• RDU</li> <li>• DPE</li> <li>• Network Registrar extensions</li> <li>• KDC</li> </ul> | None          |            |
| Port number of administrator user interface | Port number through which you access the BAC administrator user interface using HTTP                                                                                                                                                                     | 8100          |            |
|                                             | Port number through which you access the BAC administrator user interface using HTTP over SSL (HTTPS)                                                                                                                                                    | 8443          |            |
| Administrator user interface user password  | Password using which you access the BAC administrator user interface                                                                                                                                                                                     | changeme      |            |
| Web UI password                             | Password using which you access the Network Registrar administrator user interface                                                                                                                                                                       | changeme      |            |
| DPE password                                | Password using which you access the DPE in the login mode                                                                                                                                                                                                | changeme      |            |
|                                             | Password using which you access the DPE in the privileged mode                                                                                                                                                                                           | changeme      |            |



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