Installation and Setup Guide for Cisco Broadband Access Center

Release 2.7.1

June 18, 2009

CONTENTS

Preface

The *Installation and Setup Guide for Cisco Broadband Access Center, Release 2.7.1,* 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.

The preface contains the following sections:

Document Revision History

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

Revision	Date	Change Summary
OL-11759-02	June 18, 2009	1. Revised a sentence in Chapter 6, "Upgrading Broadband Access Center," in the following sections: – Introductory paragraph. – First note after the introductory paragraph. 2. Revised Table 6-1. 3. Revised Step 3 in the Upgrading the Solaris DPE procedure. 4. Revised the following in the Upgrading the Hardware DPE procedure: – First note after the introductory paragraph. – Revised the first row of the table following Step 3. – Revised the sentence after the table following Step 3. – Revised Step 6. 5. Revised Step 3 and the example in the Upgrading Network Registrar Extensions procedure. 6. Revised the following in the Upgrading the KDC: – Introductory paragraph after the first note. – Step 3. 7. Revised the Migrating the RDU Database procedure.
OL-11759-01	November 17, 2007	Initial release.

Audience

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

Note Within this installation guide you may 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 listed in the following table.

Chapter	Title	Description
Chapter 1	Overview	Provides general requirements for a successful installation of BAC.
Chapter 2	Before Installing Broadband Access Center	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.
Chapter 3	Installing Broadband Access Center	Describes how to install the individual components of BAC from the GUI or the command-line interface (CLI).
Chapter 4	Installing in a Lab Environment	Describes how to install a lab version of BAC from the GUI or the CLI.
Chapter 5	Post-Installation Activities	Describes the tasks that you must perform following installation.
Chapter 6	Upgrading Broadband Access Center	Describes how to upgrade various BAC components.
Chapter 7	Setting Up a Device Provisioning Engine	Describes how to configure a BAC component, the DPE.
Chapter 8	Uninstalling Broadband Access Center	Describes how to uninstall BAC.
Appendix A	Network Registrar Configuration File Example	Provides examples of files used to configure Cisco Network Registrar for high-speed data and voice technology deployments.
Appendix B	Installation Worksheet	Provides a worksheet that you can use to record the values that you enter during installation.

Conventions

This document uses the following conventions:

Item	Convention
Commands and keywords	**boldface** font
Variables for which you supply values	*italic* font
Displayed session and system information	`screen` font
Information you enter	**`boldface screen`** font
Variables you enter	*`italic screen`* font

Item	Convention
Menu items and button names	**boldface** font
Selecting a menu item in paragraphs	**Option > Network Preferences**
Selecting a menu item in tables	Option > Network Preferences

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

Note Means *reader 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 for any updates.

Table 1 describes the documentation that is available for this BAC release.

Table 1 Product Documentation

Document Title	Available Format
Release Notes for Cisco Broadband Access Center, Release 2.7.1	• PDF on the product CD-ROM. • On Cisco.com: http://cisco.com/en/US/products/sw/netmgtsw/ps529/prod_release_notes_list.html
Installation and Setup Guide for Cisco Broadband Access Center, Release 2.7.1	• PDF on the product CD-ROM. • On Cisco.com: http://cisco.com/en/US/products/sw/netmgtsw/ps529/prod_installation_guides_list.html
Cisco Broadband Access Center Administrator Guide, Release 2.7.1	• PDF on the product CD-ROM. • On Cisco.com: http://cisco.com/en/US/products/sw/netmgtsw/ps529/prod_maintenance_guides_list.html

Table 1   Product Documentation (continued)

Document Title	Available Format
Cisco Broadband Access Center DPE CLI Reference, Release 2.7.1	• PDF on the product CD-ROM. • On Cisco.com: http://cisco.com/en/US/products/sw/netmgtsw/ps529/prod_command_reference_list.html
To support the appliance DPE-2115: • *Device Provisioning Engine 2115 Recovery CD-ROM Release Notes* • *Installation and Setup Guide for the Cisco 1102 VLAN Policy Server*	On Cisco.com: http://cisco.com/en/US/products/sw/netmgtsw/ps529/prod_release_notes_list.html

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Caution   Refer to the VLAN Policy Server guide only for port and connector identification and to perform hardware installation. Do not perform any of the configuration instructions found in that guide.

Related Documentation

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Note   We sometimes update the printed and electronic documentation after original publication. Therefore, you should also review the documentation on Cisco.com for any updates.

Table 2 describes the related documentation that is available for this BAC release.

Table 2   Product Documentation

Document Title	Available Format
Release Notes for Cisco Network Registrar 6.2.3	On Cisco.com: http://cisco.com/en/US/products/sw/netmgtsw/ps1982/prod_release_notes_list.html
Cisco Network Registrar User's Guide, 6.2.1	On Cisco.com: http://cisco.com/en/US/products/sw/netmgtsw/ps1982/products_user_guide_list.html
Cisco Network Registrar CLI Reference Guide, 6.2.1	On Cisco.com: http://cisco.com/en/US/products/sw/netmgtsw/ps1982/prod_command_reference_list.html

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 the *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.

Overview

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 1-3
- BAC Components at a Glance, page 1-3
- Types of Installations, page 1-4

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. The application interfaces with Cisco Network Registrar, which includes a high-speed DHCP server for IP address management and a DNS server.

BAC provides such critical features as redundancy and failover. You can integrate BAC into new or existing environments through the use of a provisioning application programming interface (API) that lets you control how BAC operates.

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.

Operating System Requirements

You must install BAC on Sun SPARC computers that run the Solaris 8 or 9 operating system.

> **Note** Before installing BAC, you should download and install the recommended patches from the Sun Microsystems support site.
> BAC ships with the required Java Runtime Environment, which resides in *BPR_HOME/jre*. You can choose to install BAC with or without the Sun Java Standard Edition or the Sun Java Enterprise Edition available on your system.

For a list of JDK 1.5.0_08 patches recommended for successfully installing BAC on a system that runs:

- Solaris 9, see Table 1-1
- Solaris 8, see Table 1-2

Table 1-1   JDK Patches for Solaris 9

Patch	Description
113096-03	X11 6.6.1 OWconfig patch
112963-25	SunOS 5.9 linker patch
111711-16	32-bit shared library patch for C++
112785-57	X11 6.6.1 Xsun patch
111712-16	64-bit shared library patch for C++
113886-40	OpenGL 1.3 patch for Solaris (32-bit)
113887-40	OpenGL 1.3 patch for Solaris (64-bit)

Table 1-2   JDK Patches for Solaris 8

Patch	Description
112396-03	/usr/bin/fgrep patch
111111-06	/usr/bin/nawk patch
108987-18	Patchadd and patchrm patch
112003-03	Unable to load fontset in 64-bit Solaris 8 iso-1 or iso-15 patch
111310-01	/usr/lib/libdhcpagent.so.1 patch
108528-29	Kernel update and Apache patch
108989-02	/usr/kernel/sys/acctctl and /usr/kernel/sys/exacctsys patch
112472-01	Font2DTest2 abort when Lucida Sans Thai Typewriter selected patch
111308-05	/usr/lib/libmtmalloc.so.1 patch
112438-03	/kernel/drv/random patch
117000-05	Kernel patch
110386-03	RBAC feature patch
111023-03	/kernel/fs/mntfs and /kernel/fs/sparcv9/mntfs patch
115827-01	/sbin/sulogin and /sbin/netstrategy patch
116602-01	/sbin/uadmin and /sbin/hostconfig patch
111317-06	/sbin/init and /usr/sbin/init patch
113648-04	Mount patch
109147-41	Linker patch
108993-63	LDAP2 client, libc, libthread and libnsl libraries patch
119067-05	X11 6.4.1 Xsun patch
108921-25	CDE 1.4 dtwm patch
108434-22	32-bit shared library patch for C++

Table 1-2   JDK Patches for Solaris 8 (continued)

109326-18	libresolv.so.2 and in.named patch
108940-75	Motif 1.2.7 and 2.1.1 runtime library patch
108435-22	64-bit shared library patch for C++
113886-40	OpenGL 1.3 patch for Solaris (32-bit)
117350-43	Kernel patch
108773-26	IIIM and X Input & Output method patch
113887-40	OpenGL 1.3 patch for Solaris (64-bit)

KDC Patches for Solaris 8

The patches required to successfully install a BAC component, the Key Distribution Center, on a Solaris 8 are:

- 112438-01

- 109326-06

Network Registrar Requirements

Before you install BAC, be aware of these Network Registrar requirements:

- We recommend that you use Network Registrar 6.2.3.2 or later with BAC 2.7.1. At a minimum, you must have version 5.5.12 installed on your system.

  Note   Running BAC with a Network Registrar version lower than 6.0.3 restricts the use of certain features in this release.

- You must install a Network Registrar DHCP server on a computer running Solaris 8 or 9.

- 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, refer to the *Cisco Network Registrar User's Guide*, *6.2.1*.

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.

DPEs include factory-installed software that enables provisioning, but you must perform some initial setup.

Note This release supports the DPE-2115 hardware DPE. For information on installation procedures related to a DPE-2115, see the *Installation and Setup Guide for the Cisco 1102 VLAN Policy Server*:
www.cisco.com/en/US/products/sw/secursw/ps2136/
products_installation_and_configuration_guide_book09186a00801f0d02.html

- A Key Distribution Center (KDC)

    The KDC and the DPE registration services handle the authentication of all voice technology media terminal adapters (MTAs). The KDC is required only when configuring a system to support voice technology operations.

    When you perform a lab installation, the KDC is installed on the lab computer. For performance reasons however, in a component installation, install the KDC on a separate server.

- One or more Network Registrar servers

    Network Registrar provides the DHCP and Domain Name System (DNS) functionality. Implementing dynamic DNS (DDNS) within Network Registrar increases the number of servers you need to deploy.

Types of Installations

Note Before installing BAC, familiarize yourself with the installation startup processes and checklists described in Before Installing Broadband Access Center, page 2-1

This guide describes two types of installation:

- Component—Installs one or more components of BAC: the RDU, Network Registrar extensions, one or more DPEs, and the KDC. See Installing Broadband Access Center, page 3-1, for detailed procedures.
- Lab—Installs BAC for use in a laboratory environment for demonstration or evaluation before deploying BAC into a network. See Installing in a Lab Environment, page 4-1, for detailed procedures.

You can install BAC from the GUI or the command-line interface of the installation program.

C H A P T E R **2**

Before Installing Broadband Access Center

This chapter explains how to prepare for a successful installation of Broadband Access Center (BAC).

This chapter describes:

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 Solaris 8 or 9 server that fulfills the requirements described in BAC Components at a Glance, page 1-3.

    The RDU:

    - Manages the generation of device configurations.

    - Processes application programming interface (API) requests for all BAC functions.

    - Manages the BAC system.

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Note The installation program preloads required data into the RDU database, and starts the RDU daemon through the BAC process watchdog. The SNMP agent and the administrator user interface are installed for the RDU. For details on configuring the SNMP agent, refer to the *Cisco Broadband Access Center DPE CLI Reference 2.7.1*. For information on the BAC process watchdog and the administrator user interface, refer to the *Cisco Broadband Access Center Administrator Guide 2.7.1*.

- Device Provisioning Engine (DPE)

    A DPE is the major component of the provisioning group, handling all device interactions with the RDU. You should install a DPE on Sun SPARC computers that run on Solaris 8 or Solaris 9 servers that meet the requirements described in BAC Components at a Glance, page 1-3.

The DPE:

– Caches instructions generated at the RDU.

– Manages various CPE protocol services. These services obtain their operating instructions from the instruction cache.

> **Note** 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 2.7.1*.

- 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** We recommend that you install the BAC Network Registrar extensions on a server on which Network Registrar 6.2.3.2 or later runs.

- Key Distribution Center (KDC)

  The KDC, along with the DPE registration service, handles the authentication of all PacketCable voice technology MTAs. For maximum performance and segmentation of the network, you may install one KDC instance per provisioning group. When you perform a laboratory installation, the KDC is installed on the lab computer. For performance reasons however, in a component installation, you should install the KDC on a separate server.

  > **Note** The KDC and DPE require service keys, which allow them to communicate.

Installation and Startup Process

To ensure a smooth 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.

Step 1 Determine the computers and servers on which you are installing individual components of BAC.

Step 2 Verify the file system block size of the directory in which you intend to install the BAC database and database transaction log files. See Database Requirements, page 2-5.

Step 3 Review the installation checklist described in Installing Broadband Access Center, page 3-1.

Step 4   Install the RDU. Ensure that you:

- Know the target location for the:
  - Home directory
  - Data directory
  - Database Transaction Logs directory
- Verify the existence of a text file called *log.txt*, which indicates that errors occurred during the installation process. This file resides in the *BPR_HOME* directory.

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

- Home directory
- Data directory

> **Note**   If you exit the BAC installation after the operating system database is installed, you must uninstall the *BPR_HOME* and the *BPR_DATA* directories before installing the product again. See Uninstalling Broadband Access Center, page 8-1, for information on how to uninstall BAC. Also, stopping the installation midway does not generate the log file.

Step 6   After installing the RDU, ensure that you:

a. Obtain a valid BAC license key for each technology that you provision. This includes the DPE and the KDC components.

> **Note**   If you have not yet received your licenses, contact your Cisco representative before proceeding.

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

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

http://*machine_name:port_number*/

> **Note**   To access the administrator user interface via HTTP over SSL, also known as HTTPS, 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 runs. The default port number is:
  - 8100 for HTTP over TCP
  - 8443 for HTTP over SSL

The main login page appears.

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 and prompts you to change the default password. Enter a new password, and click **Login**.

Step 7   Optionally, configure the syslog file for alerts. See Configuring the Syslog Utility to Receive Alerts from BAC, page 5-1.

> **Note**   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 enable password from the command-line interface (CLI).

   –   To change the login password, access the CLI in the enabled mode, and enter:

```
dpe# password password
```

   where *password* identifies the new DPE password.

   –   To change the DPE enable password, enter:

```
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 2.7.1*.

   b.   Configure the DPE from the CLI. For configuration instructions, refer to the *Cisco Broadband Access Center DPE CLI Reference 2.7.1*.

Step 9   Install and configure Network Registrar, if it is not already installed on your systems. We recommend that you use Network Registrar 6.2.3.2 or later. At a minimum, you must have version 5.5.12 installed on your system. For installation information, refer to the *Cisco Network Registrar Installation Guide, 6.2*.

   •   When you install the Network Registrar Local Cluster (LCCM), ensure that you:

   a.   Obtain a valid Network Registrar license key for local cluster.

   b.   On all Network Registrar local cluster servers, install BAC extensions. See Installing Network Registrar Extensions from the CLI, page 3-6.

   c.   Configure Network Registrar, including its extensions. Specifically, you need to configure scopes, policies, client classes, and scope-selection tags. See Configuring Extensions, page 3-9. Also refer to the *Cisco Network Registrar User's Guide*, 6.2.1.

   d.   Configure the Network Registrar syslog for alerts and debugging information. See Configuring the Syslog Utility to Receive Alerts from BAC, page 5-1.

   e.   Validate the installation by connecting to the administrator user interface and viewing the administrator user interface. For more information, refer to the *Cisco Broadband Access Center Administrator Guide 2.7.1*.

   •   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 key for the Network Registrar Regional Server.

   c.   After you install the BAC extensions for the product on all Network Registrar local servers, replicate the local data into regional and pull the "Replica Address Space". For more information, refer to the *Cisco Network Registrar User's Guide, 6.2.1*.

   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 *Cisco Network Registrar User's Guide, 6.2.1.*

   e. Configure this Network Registrar Regional CCM Server's IP address, port number, and login details into the RDU defaults for IP Reservation support. For more information, refer to the *Cisco Broadband Access Center Administrator Guide 2.7.1.*

> **Note** Network Registrar versions earlier than 6.1 do not support the Regional Cluster feature. Hence, you cannot use the IP Lease Reservation feature that BAC supports.

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

- Obtain a valid BAC license.

- 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 block size or greater. If your system configuration does not support an 8-KB block size, then configure the block size in multiples of 8 KB; for example, 16 KB or 32 KB.

The installation program prompts you to specify a directory in which to install database files and database log files. These directories are identified in BAC with 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 Log in as *root*.

Step 2 Run the UNIX **mount** command without any parameters to determine on which file system device the directory resides. The default directory is */var/CSCObpr*.

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 3   To determine the file system block size, use the **df** command.

For example:

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

/var (/dev/dsk/c0t0d0s4): 8192 block size1024 frag size
    961240 total blocks851210 free blocks 755086 available243712 total files
        239730 free files35651588 filesys id
            ufs fstype0x00000004 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   Log in as *root*.

Step 2   Run the UNIX **mount** command without parameters.

For example:

```
# mount
/ on /dev/dsk/c1t0d0s0
read/write/setuid/intr/largefiles/logging/xattr/onerror=panic/dev=1d80008 on Thu Jun 15
16:58:16 2006
/etc/mnttab on mnttab read/write/setuid/dev=4740000 on Thu Jun 15 16:58:14 2006
/var on /dev/dsk/c1t0d0s4
read/write/setuid/intr/largefiles/logging/xattr/onerror=panic/dev=1d8000c on Thu Jun 15
16:58:21 2006
/var/run on swap read/write/setuid/xattr/dev=1 on Thu Jun 15 16:58:22 2006
/tmp on swap read/write/setuid/xattr/dev=2 on Thu Jun 15 16:58:39 2006
```

Step 3   Note whether the intended file system contains the keyword **largefiles**.

For example:

```
/var on /dev/dsk/c1t0d0s4
read/write/setuid/intr/largefiles/logging/xattr/onerror=panic/dev=1d8000c on Thu Jun 15
16:58:21 2006
```

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

Installing Broadband Access Center

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

Before you install BAC, ensure that you are ready by reviewing the following checklist:

1. Verify if your system meets the minimum system hardware and software requirements described in Overview, page 1-1.

2. Ensure that you have *root* access to the computers on which you intend to install BAC components.

3. Keep your BAC license key or keys at hand. You need a valid license key for each technology that you want to provision with BAC.

4. Determine the home directory (*BPR_HOME*) in which you want to install the BAC component or components. The default directory is */opt/CSCObpr*. Ensure that the target installation directory has enough disk space.

   > **Note** We recommend that you have at least 350 MB of disk space available.

5. For the RDU, determine where you want to install the data directory (*BPR_DATA*) and the database transaction logs (*BPR_DBLOG*). The default directory is */var/CSCObpr*. Ensure that the target installation directory has enough disk space.

   > **Note** We recommend that you locate the data directory on a different physical disk than the home directory; for example, */var/disk0/CSCObpr*. The disk should have at least 1 GB and up to 30 GB of free space.
   > The installation program, by default, installs the database transaction logs directory and the data 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.

6. For the RDU, determine the listening port number. This port is the interface that the RDU uses to communicate with other BAC components, such as DPEs and Cisco Network Registrar extension points. The default port is 49187.

7. For the RDU, select 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. The default shared secret password is **secret**.

8. Ensure that Network Registrar 5.5.12 is installed on the servers on which you are installing BAC extensions. We recommend that you install version 6.2.3.2 or later.

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

10. For the Network Registrar extensions, determine where you want to install the data directory (*BPR_DATA*). The default directory is */var/CSCObpr*.

11. Verify that you have the necessary Network Registrar configuration files. For an example of these configuration files, see the Network Registrar Configuration File Example, page A-1.

12. Verify that you have the necessary KDC servers available.

You install BAC from the GUI or the command-line interface (CLI). BAC ships with both interfaces are supplied with BAC. Refer to:

- Installing from the CLI, page 3-2
- Installing from the GUI, page 3-14

Installing from the CLI

The initial steps in the BAC installation program are identical regardless of the component you are installing. Complete the steps described in this initial installation procedure before you proceed further.

To install BAC from the command line:

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:

a. Change to the directory in which you will decompress and extract the installation file.

b. Decompress the file with the *.gtar.gz* extension. Use this syntax:

```
gunzip -d BACC_271_SolarisK9.gtar.gz
```

c. Unpack the file with the *.gtar* extension that gunzip decompressed:

```
tar -xvf BACC_271_SolarisK9.gtar
```

The utility creates the */BACC_271_SolarisK9* directory in which the installation program, *setup.bin*, is extracted.

d. Change to the */BACC_271_SolarisK9* directory:

```
cd BACC_271_SolarisK9
```

Step 3   To start the installation program, enter:

```
# ./setup.bin -console
```

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

Step 4   Press **Enter** to continue.

Step 5   The program prompts you to choose the installation type. You can choose:

- Individual components installation. (Enter **c**.)
- Lab installation. (Enter **l**.)

For example:

```
Choose Installation

Choose the type of BPR installation you want to install.

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

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

Step 6   The program prompts you to confirm the installation type. Enter **y** and press **Enter** to continue.

Depending on the option you selected in Step 5, you continue with component installation or lab installation.

- To install individual components, see Installing Components from the CLI, page 3-3.

- To install in a lab environment, see Installing in a Lab Environment, page 4-2.

Installing Components from the CLI

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

Note   Before you begin any of these procedures, you must complete the initial installation procedure described in the previous section.

For instructions on installing the components, refer to:

- Installing the RDU from the CLI, page 3-3

- Installing Network Registrar Extensions from the CLI, page 3-6

- Installing a DPE from the CLI, page 3-10

- Installing the KDC from the CLI, page 3-12

Installing the RDU from the CLI

Install the RDU on a Solaris 8 or Solaris 9 server that meets the requirements described in BAC Components at a Glance, page 1-3.

To install the RDU, complete the initial installation described in Installing from the CLI, page 3-2. Then:

Step 1   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, or the KDC, enter **n** and press **Enter** against each option. You can choose to install these options later.

For example:

```
Installation Components

Select one or more components to install BPR.
    Regional distribution unit (RDU) (y/n/?) [no] y
```

```
                        Cisco Network Registrar extension points (y/n/?) [no] n
                        Device Provisioning Engine (DPE) (y/n/?) [no] n
                        Key Distribution Center (KDC) (y/n?) [no] n
```

Step 2   The program prompts you to confirm the components that you want to install. Enter **y** and press **Enter** to continue.

Step 3   The program displays a message that it is starting validation of the installation parameters. Press **Enter** to continue.

For example:

```
Starting the individual component installation parameters validation.

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

Step 4   The Home Directory Destination prompt appears. To accept the default directory, */opt/CSCObpr*, press **Enter**; or enter a different directory.

For example:

```
Home Directory Destination

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

When the program asks if you want to create the default installation directory, enter **y** and press **Enter**.

For example:

```
Choosing yes will create the directory during the installation.
Choosing no will allow a different directory to be chosen.

    The directory /opt/CSCObpr does not exist. Create it? (y/n/?) [yes]
```

Step 5   To confirm the directory, enter **y** and press **Enter**.

Step 6   The data directory destination prompt appears. To accept the default directory, */var/CSCObpr*, press **Enter**; or enter a different directory.

For example:

```
Data Directory Destination

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

Step 7   To confirm the directory, enter **y** and press **Enter**.

Step 8   The program prompts you to enter the database transaction logs destination. To accept the default directory, */var/CSCObpr*, press **Enter**; or enter another directory.

For example:

```
Database Transaction Logs Destination

Logs Directory Destination

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

Step 9   To confirm the directory. Enter **y** and press **Enter** to continue.

Step 10   The program prompts you to enter the Regional Distribution Unit Host/Port. Enter the listening port for the RDU.

> ✎
>
> **Note** The RDU listens on all interfaces. 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.

To accept the default value, 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 2.7.1*.

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

For example:

```
Regional Distribution Unit Host/Port

Enter the IP address and the listening port of the Regional Distribution Unit (RDU)
associated with this installation.

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

    RDU Listening Port [49187]
```

Step 11 Confirm the listening port number; enter **y** and press **Enter** to continue.

Step 12 The program prompts you to enter the shared secret password. Enter the shared secret password that you want to use for authentication among BAC servers; the default password is **secret**.

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

For example:

```
Shared Secret Password

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

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

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

Step 13 Press **Enter** to continue.

Step 14 The program displays the installation parameters you have selected. Enter **y** and press **Enter** to confirm the parameters, and install the RDU component.

For example:

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

Home directory:/opt/CSCObpr
```

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

Step 15 The program displays the Installation summary when installation is complete.

For example:

```
Installation Summary

The installation program has successfully installed Cisco Broadband Provisioning Registrar
(BPR) on your system.
```

Step 16 Press **Enter** to exit the installation program.

Installing Network Registrar Extensions from the CLI

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. The remainder of this section explains how to install, configure, and validate these extensions.

Before you install Network Registrar extensions, complete the steps described in Installing from the CLI, page 3-2, and ensure that Network Registrar is running. Then:

Step 1 When the installation program prompts you to select one or more components, at the Network Registrar Extension Points prompt, enter **y** and press **Enter**.

> ✎
>
> **Note** The installation program validates your Network Registrar installation. We recommend that you have Network Registrar 6.2.3.2 or later installed on your server. At a minimum, you must have version 5.5.12 installed on your system. If the required version is not installed, the installation process terminates. You must upgrade to the required version before proceeding.

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

For example:

```
Installation Components

Select one or more components to install BPR.

    Regional distribution unit (RDU) (y/n/?) [no] n
    Cisco Network Registrar extension points (y/n/?) [no] y
    Device Provisioning Engine (DPE) (y/n/?) [no] n
    Key Distribution Center (KDC) (y/n?) [no] n
```

Step 2 The program prompts you to confirm the components that you want to install. Enter **y** and press **Enter**.

Step 3 The program displays a message that it is starting validation of the component installation parameters. Press **Enter** to continue.

For example:

```
Starting the individual component installation parameters validation.
    Press Enter to Continue or 'q' to Quit:

Validating the individual component installation parameters - Please wait.
```

Step 4   The Home Directory Destination prompt appears. To accept the default directory, */opt/CSCObpr*, press **Enter**; or enter another directory.

For example:

```
Home Directory Destination

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

Step 5   The program then asks you to confirm the directory. Press **y** and **Enter** to continue.

Step 6   The data directory destination prompt appears. To accept the default directory, */var/CSCObpr*, 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/CSCObpr*.

For example:

```
Data Directory Destination

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

Step 7   To confirm the directory, enter **y** and press **Enter**.

Step 8   The program prompts you to enter the Regional Distribution Unit Host/Port. Enter the IP address (or hostname) and listening port of the host where the RDU software is installed. To confirm this information, enter **y** and press **Enter**.

For example:

```
Regional Distribution Unit Host/Port

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

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

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

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

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

Step 9   You are then prompted to enter the name of the extension point provisioning group. Enter the name of the Network Registrar extension point group.

For example:

```
Cisco Network Registrar Extension Point Provisioning Group
Enter the Cisco Network Registrar extension point provisioning group.

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

    Extension Point Provisioning Group [] group1
```

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

Step 11 The program then asks you if you intend to provision voice technology devices. Press **y** if you are using voice technology devices; press **n** if you are not.

For example:

```
Are you going to use a device(s) that supports PacketCable voice technology?

If you are going to use PacketCable devices we need some more info.
Enter Yes to Install PacketCable and No if you do not want Packetcable
installed [No]: yes
```

Step 12 To confirm, enter **y** and press **Enter**.

> **Note** If you enter **n**, jump to Step 15; otherwise, continue with the installation.

Step 13 If you chose to install PacketCable, the program prompts you to enter several voice technology properties.

For example:

```
Enter KDC Realm Name      ACME.COM

Enter the IP Address of the Primary DHCP Server.10.10.10.1

Enter the IP Address of the Primary DNS Server.10.10.10.3

Enter the IP Address of the Secondary DHCP Server.10.10.10.2

Enter the IP Address of the Secondary DNS Server.10.10.10.4
```

Step 14 Confirm the information; enter **y** and press **Enter**.

Step 15 Enter the shared secret password that you want to use for authentication among BAC servers; the default password is **secret**.

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

For example:

```
Shared Secret Password

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

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

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

Step 16 Press **Enter** to continue the installation.

Step 17 The program displays the installation parameters you have selected. Enter **y** and press **Enter** to confirm the parameters, and install the Network Registrar extensions.

For example:

```
Installation Parameters

This screen shows the installation parameters that you have chosen:
```

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

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

Step 18   When installation is complete, the Installation Summary appears. Press **Enter** to exit.

For example:

```
Installation Summary

The installation program has successfully installed Cisco Broadband
Access Center (BAC) on your system.
```

Configuring Extensions

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

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

> **Note**   The *NR_HOME* path that this procedure describes is defined as the Network Registrar installation directory (the default directory is */opt/nwreg2*), followed by the */regional* or */local* directory depending on the Network Registrar version that is installed on your system. For example, if you have installed:
>
> - Version 6.1 or later, use */opt/nwreg2/local/* for the local cluster and */opt/nwreg2/regional* for the regional cluster.
> - Versions lower than 6.1, use */opt/nwreg2/local*.

To configure extensions:

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

Step 2   At the command line, enter:

```
# NR_HOME/usrbin/nrcmd -N admin -P changeme -b <
BPR_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/usrbin/nrcmd -N admin -P changeme "dhcp reload"
```

⚠

Caution   Before you can use the Network Registrar server, you must configure client classes, scope-selection tags, policies, and scopes. Refer to the *Cisco Network Registrar User's Guide, 6.2.1.*

Validating Extensions

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

```
nrcmd> extension list
100 Ok
dexdropras:
    entry = dexdropras
    file = libdexextension.so
    init-args =
    init-entry =
    lang = Dex
preClientLookup:
    entry = bprClientLookup
    file = libbprextensions.so
    init-args = BACC_HOME=/opt/CSCObpr,BACC_DATA=/var/CSCObpr
    init-entry = bprInit
    lang = Dex
prePacketEncode:
    entry = bprExecuteExtension
    file = libbprextensions.so
    init-args =
    init-entry =
        lang = Dex
```

✎

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: dexdropras
pre-packet-encode: prePacketEncode
pre-client-lookup: preClientLookup
post-client-lookup:
post-send-packet:
pre-dns-add-forward:
check-lease-acceptable:
```

Installing a DPE from the CLI

Install a DPE on Solaris 8 or Solaris 9 server that meets the requirements described in BAC Components at a Glance, page 1-3.

✎

Note   During DPE installation, if the program detects the presence of a TFTP server running on the same computer that the DPE is being installed on, the installation terminates and error messages appear.

To install the DPE, complete the steps described in Installing from the CLI, page 3-2, then:

Step 1   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** against these options.

For example:

```
Installation Components

Select one or more components to install BPR.

    Regional distribution unit (RDU) (y/n/?) [no] n
    Cisco Network Registrar extension points (y/n/?) [no] n
    Device Provisioning Engine (DPE) (y/n/?) [yes] y
    Key Distribution Center (KDC) (y/n/?) [no] n
```

Step 2   The program prompts you to confirm the components that you want to install. Enter **y** and press **Enter** to continue.

Step 3   The program displays a message that it is starting validation of component installation validation. Press **Enter** to continue.

Validation involves checking to verify that the correct patches have been installed. If they are not installed, error messages appear on screen.

Step 4   When validation is complete, the Home Directory Destination prompt appears. To accept the default directory, */opt/CSCObpr*, press **Enter**; or enter another directory.

For example:

```
Home Directory Destination

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

Step 5   When the program asks if you want to create the default installation directory, enter **y** and press **Enter**.

For example:

```
Choosing yes will create the directory during the installation. Choosing no will allow a
different directory to be chosen.

    The directory /opt/CSCObpr does not exist. Create it? (y/n/?) [yes]
```

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

Step 7   The Data Directory Destination prompt appears. To accept the default directory, */var/CSCObpr*, press **Enter**; or enter another directory.

For example:

```
Data Directory Destination

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

Step 8   When the program asks if you want to create the default installation directory, enter **y** and press **Enter**.

For example:

```
Choosing yes will create the directory during the installation. Choosing no will allow a
different directory to be chosen.

    The directory /var/CSCObpr does not exist. Create it? (y/n/?) [yes]
```

Step 9   To confirm, enter **y** and press **Enter**.

Step 10   The program displays the installation parameters that you selected. Enter **y** and press **Enter** to install the DPE.

For example:

```
Installation Parameters

This screen shows the installation parameters that you have chosen:

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

    Home directory: /opt/CSCObpr
    Data directory: /var/CSCObpr
```

Step 11   When installation is complete, the Installation Summary appears. Press **Enter** to exit the installation program.

Installing the KDC from the CLI

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

For maximum performance and segmentation of the network, you may install one KDC instance per provisioning group. For performance reasons, you should install the KDC on a separate server.

To install the Key Distribution Center (KDC), complete the steps described in Installing from the CLI, page 3-2, then:

Step 1   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, Network Registrar extension points, and a DPE, enter **n** and press **Enter** against these options.

For example:

```
Installation Components

Select one or more components to install BPR.

    Regional distribution unit (RDU) (y/n/?) [no] n
    Cisco Network Registrar extension points (y/n/?) [no] n
    Device Provisioning Engine (DPE) (y/n/?) [no] n
    Key Distribution Center (KDC) (y/n/?) [yes] y
```

Step 2   Confirm the components that you want to install; enter **y** and press **Enter**.

Step 3   The program displays a message that it is starting component installation validation. Press **Enter** to continue.

Step 4   When validation is complete, the home directory destination prompt appears. To accept the default directory, */opt/CSCObpr*, press **Enter**; or enter another directory.

For example:

```
Home Directory Destination

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

```
                 Choosing yes will create the directory during the installation. Choosing no will allow
                 a different directory to be chosen.

                 The directory /opt/CSCObpr does not exist. Create it? (y/n/?) [yes]
```

Step 5   The data directory destination prompt appears. To accept the default directory, */var/CSCObpr*, press **Enter**; or enter another directory.

For example:

```
Data Directory Destination

    Data Directory Destination [/var/CSCObpr]

    Choosing yes will create the directory during the installation. Choosing no will allow
    a different directory to be chosen.

    The directory /var/CSCObpr does not exist. Create it? (y/n/?) [yes]
```

Step 6   To confirm, enter **y** and press **Enter**.

Step 7   Enter the KDC interface address, the fully qualified domain name (FQDN), and the realm name.

For example:

```
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.

    KDC Interface Address [10.10.10.5]
    KDC FQDN [acme_u6.acme.com]
    KDC Realm [ACME.COM]
```

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

Step 9   The program prompts you to enter the KDC service key and the DPE FQDN.

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 each DPE, enter a password between 6 and 20 characters, press **Enter**; enter the FQDN of the DPE, press **Enter**.

For example:

```
KDC Service Key and DPE Panel

Please Enter the Necessary Info

    Enter Password Here [] 12345678901234567890
    Enter Your DPE FQDN [] dpe1.cisco.com
```

Note   To generate the service key on the:

- DPE, use the **packetcable registration kdc-service-key** command from the DPE CLI. For details, refer to the *Cisco Broadband Access Center DPE CLI Reference 2.7.1.*

- KDC, use the KeyGen tool. For details, refer to the *Cisco Broadband Access Center Administrator Guide 2.7.1.*

Step 10   The program prompts you to enter the information for another DPE. 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.

Step 11   To confirm and continue, enter **y** and press **Enter**.

Step 12   The program displays the installation parameters that you selected. Enter **y** and press **Enter** to confirm the parameters, and install the KDC.

For example:

```
Installation Parameters

This screen shows the installation parameters that you have chosen:

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

    KDC realm name: ACME.COM
    Home directory: /opt/CSCObpr
    Data directory: /var/CSCObpr
```

Step 13   The program displays the Installation Summary when installation is complete. Press **Enter** to exit.

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

Installing from the GUI

The initial steps in the installation program are identical regardless of the component you are installing.

To install BAC from the graphical interface:

Step 1   Using an X-Windows client, log in to the computer on which you intend to install the BAC components, with *root* access.

Step 2   Ensure that the **gzip** and **gtar** utilities are available on your system to decompress and unpack the BAC installation file, and:

    a.   Change to the directory in which you will decompress and extract the installation file.

    b.   Decompress the file with the *.gtar.gz* extension. Use this syntax:

        gunzip BACC_271_SolarisK9.gtar.gz

    c. Unpack the file with the *.gtar* extension that gunzip decompressed:

       `tar -xvf BACC_271_SolarisK9.gtar`

    The utility creates the */BACC_271_SolarisK9* directory in which the installation program, *setup.bin*, is extracted.

    d. Change to the */BACC_271_SolarisK9* directory:

       `cd BACC_271_SolarisK9`

Step 3 Enter this command to start the installation program:

    `> ./setup.bin`

The installation program verifies that you have installed the correct patches on the Solaris operating system. When the verification is complete, the program displays welcome information.

Step 4 Click **Next**.

Step 5 The Choose Installation Type screen appears. Choose one of the two installation types:

- Individual Components—Use to install the RDU, Network Registrar extensions, a DPE, or the KDC. See Installing Components from the GUI, page 3-15.

- Lab—Use to install the software in a laboratory environment. See Installing in a Lab Environment, page 4-1

Step 6 Click **Next**.

Depending on the option you selected in Step 5, either the Installation Components screen appears, or you begin the lab installation.

Installing Components from the GUI

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

Note Before you begin any of these procedures, you must complete the initial installation procedure described in the previous section.

For installation instructions, refer to:

- Installing the RDU from the GUI, page 3-16
- Installing Network Registrar from the GUI, page 3-17
- Installing a DPE from the GUI, page 3-18
- Installing the KDC from the GUI, page 3-19

For more information about each component, see BAC Components, page 2-1.

Installing the RDU from the GUI

This section explains how to install the RDU. Install the RDU server on a Solaris 8 or 9 server that meets the requirements described in BAC Components at a Glance, page 1-3.

To install the RDU server, complete the steps described in Installing from the GUI, page 3-14; then, follow this procedure.

Step 1   On the Installation Components screen, check the Regional Distribution Unit (RDU) check box and click **Next**.

Step 2   The Home Directory Destination screen appears. To choose the location of the home directory (*BPR_HOME*), accept the default directory (*/opt/CSCObpr*). Or, enter a new target directory. You can use the **Browse** button to select a new directory. Click **Next**.

Step 3   The installation program displays the Create Directory dialog box. Click **Yes** to continue.

Step 4   The Data Directory Destination screen appears. To install the data directory (*BPR_DATA*), accept the default directory (*/var/CSCObpr*). Or, enter a new directory. You can use the **Browse** button to select a new directory. Click **Next**.

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

Step 6   The Database Transaction Logs Destination screen appears. Enter the target directory in which you want to install the transaction logs (*BPR_DBLOG*). The default directory is */var/CSCObpr*. Or, use the **Browse** button to select a new directory. Click **Next**.

Step 7   When the Create Directory dialog box appears, click **Yes**.

Step 8   The Regional Distribution Unit Host/Port screen appears. Accept the default listening port number (49187), or enter a new port number. Click **Next**.

⚠

Caution   If you change the default listening port value, ensure that the new value does not conflict with any existing port assignments. Also, ensure that you configure all DPEs and Network Registrar servers with the correct RDU port number. For information about configuring the DPE and Network Registrar extensions, refer to the *Broadband Access Center Administrator Guide 2.7.1.*

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

Step 9   The Shared Secret Password screen appears. Enter and confirm the shared secret password. Remember to use the same shared secret for the RDU, the DPEs, and Network Registrar extension points in your network. Click **Next**.

Step 10   The Installation Parameters screen appears. This screen identifies the values that you have entered in the previous screens. To change any of the values entered previously:

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

b.   Make the necessary changes.

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

Or, just click **Next**.

Step 11   When the installation is complete, the Installation Summary screen appears. Click **Finish** to exit the installation program.

Installing Network Registrar from the GUI

You install BAC extensions on a Network Registrar server. If you are deploying BAC in a failover environment, you must install the extensions on the failover servers also. After you install extensions, you need to configure them. For configuration instructions, see Configuring Extensions, page 3-9.

Before you install the Network Registrar extensions, complete the steps described in Installing from the GUI, page 3-14. To install the extensions:

Step 1 On the Installation Components screen, check the Cisco Network Registrar extension points check box, then click **Next**.

> **Note** The installation program validates your Network Registrar installation. We recommend that you have Network Registrar 6.2.3.2 or later versions installed on your server. At a minimum, you must have version 5.5.12 installed on your system. If the required version is not installed, the installation process terminates, and you must upgrade to the required Network Registrar version before proceeding.

Step 2 The Home Directory Destination screen appears. To choose the location of the home directory (*BPR_HOME*), accept the default directory (*/opt/CSCObpr*). Or, enter a new target directory. You can click the **Browse** button to locate the desired directory.

> **Note** The installation program does not ask for the home directory when it identifies that you are installing BAC components on a computer that already has a BAC component installed on it.

Step 3 Click **Next**. The installation program performs some validation and, prompts you to create the directory, if necessary.

Step 4 The Data Directory Destination screen appears. To install the data directory, accept the default directory (*/var/CSCObpr*); or, enter a new directory. You can use the **Browse** button to select a new directory.

Step 5 Click **Next**.

Step 6 The program displays the Create Directory dialog box. Click **Yes** to continue.

Step 7 The Regional Distribution Unit Host/Port screen appears. Enter the:

- IP address (or hostname) of the server on which the RDU software is installed. By default, the name of the local host appears in the RDU IP Address field.
- Listening port of the host. The RDU uses the listening port to communicate with the DPEs and Network Registrar extension points.

Step 8 Click **Next**.

Step 9 The Network Registrar Extension Point Provisioning Group screen appears. Enter the name of the extension point provisioning group.

> **Note** This is a required field. The value you specify must contain not more than 10 alphanumeric characters without spaces. You can change this value, from the BAC command-line tool, once installation is complete.

Step 10 Click **Next**.

Step 11 The PacketCable voice technology screen appears. Click:

- **Yes** if you want to install the voice technology option.

- **No** if you do not have a valid license key for this technology. After clicking **No**, go to Step 13.

Step 12 The PacketCable Properties screen appears. Enter the appropriate information in the fields, based on the following descriptions:

Field Name	Description
Kerberos Realm Name	Specifies, using a unique name, the Kerberos realm. This must match the realm set at the associated components.
IP Address of Primary DHCP Server	Specifies the IP address of the voice technology primary DHCP server.
IP Address of Primary DNS Server	Specifies the IP address of the computer which is running the primary DNS server.
IP Address of Secondary DHCP Server	Specifies the IP address of the voice technology secondary DHCP server.
IP Address of Secondary DNS Server	Specifies the IP address of the computer which is running the secondary DNS server; if that server is being used.

Step 13 Click **Next**.

Step 14 The Shared Secret Password screen appears. Enter and confirm the shared secret password.

✎
Note   Use the shared secret password that you entered during the RDU installation.

Step 15 Click **Next**.

Step 16 The Installation Parameters screen appears. This screen identifies the values that you have entered in the previous screens. To modify any of the values entered click **Back** until the desired screen appears.

Step 17 Click **Next**.

Step 18 When the installation is complete, the Installed Components Summary screen appears. Click **Finish** to exit the installation program.

✎
Note   To configure the extensions, complete the procedure described in Configuring Extensions, page 3-9.

Installing a DPE from the GUI

To install the DPE, complete the steps described in Installing from the GUI, page 3-14, then:

Step 1 On the Installation Components screen, check the Device Provisioning Engine (DPE) check box, then click **Next** to continue.

Step 2 The Home Directory Destination screen appears. To install the home directory (*/BPR_HOME*), accept the default location (*/opt/CSCObpr*), or click the **Browse** button to locate the desired directory.

✎

Note   The installation program does not ask for the home directory when it identifies that you are installing BAC components on a computer that already has a BAC component installed on it.

Step 3   Click **Next**.

Step 4   The installation program prompts you to create the directory, if necessary.

Step 5   The Data Directory Destination screen. To install the data directory (*BPR_DATA*), accept the default target location (*/var/CSCObpr*); or, enter a new directory. You can use the **Browse** button to select a new directory.

Step 6   Click **Next**.

Step 7   The Installation Parameters screen appears. After verifying that the parameters are correct, click **Next** to install the DPE, or **Back** to modify the parameters.

Step 8   When installation is complete, the Installation Summary screen appears. Click **Finish** to end the installation process and exit the program.

Installing the KDC from the GUI

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

For maximum performance and segmentation of the network, you may install one KDC per provisioning group. For performance reasons in a component installation, install the KDC on a separate server.

To install the Key Distribution Center (KDC), complete the steps described in Installing from the GUI, page 3-14, then:

Step 1   On the Installation Components screen, check the Key Distribution Center check box. Click **Next**.

Step 2   The Home Directory Destination screen appears. To install the home directory (*BPR_HOME*), accept the default target location (*/opt/CSCObpr*); or, click the **Browse** button to locate the desired directory.

Step 3   Click **Next**.

Step 4   The installation program prompts you to create the directory. Click **Yes** to continue.

Step 5   The Data Directory Destination screen. Install the data directory (*BPR_DATA*) in the default location (*/var/CSCObpr*). You can click the **Browse** button to select a new directory.

Step 6   Click **Next.**

Step 7   The Key Distribution Center Realm Name screen appears. Enter the appropriate information in the fields based on the following descriptions.

Field Name	Description
KDC Realm	Specifies, using a unique name, the Kerberos realm. This value must match the realm set at the associated components.
KDC FQDN	Identifies the fully qualified domain name (FQDN) on which the KDC server is located.
KDC Interface Address	Specifies the interface (generally the IP address of the KDC server) on which the KDC listens for requests.

Step 8   Click **Next.**

Step 9   The KDC Service Key and DPE Panel screen appears. The 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 each DPE, enter a password between 6 and 20 characters, and the FQDN; click **Add**. Continue to add additional DPEs as necessary.

Note   To generate the service key on the:

- DPE, use the **packetcable registration kdc-service-key** command from the DPE CLI. For details, refer to the *Cisco Broadband Access Center DPE CLI Reference 2.7.1*.

- KDC, use the KeyGen tool. For details, refer to the *Cisco Broadband Access Center Administrator Guide 2.7.1*.

Step 10   Click **Next**.

Step 11   The Installation Parameters screen appears. After verifying that the parameters are correct, click **Next** to install BAC, or **Back** to modify the parameters.

Step 12   When installation is complete, the Installation Summary screen appears. Click **Finish**.

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

Installing in a Lab Environment

This chapter describes how to install Broadband Access Center (BAC) in a lab environment to demonstrate product functionality and how to configure a cable modem termination system (CMTS) and the Cisco Network Registrar server to support BAC.

When you install BAC in a lab environment, the installation program installs all components on a single server. The lab installation program is designed to keep the installation and configuration as simple as possible by using a predefined overall system configuration. When you complete the installation, however, you must perform some setup on a CMTS and on Network Registrar.

This chapter features:

-
-

You can install BAC in a lab environment on a computer running the Solaris 8 or 9 operating system. Before you run the installation program, use the following checklist to ensure that you are ready:

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

2. Ensure that you have *root* access to the computers where you intend to install BAC.

3. Keep your BAC evaluation license key or keys at hand. You need a valid license key for each technology that you want to provision with BAC.

4. Ensure that Network Registrar is installed and running on the servers on which you intend to install BAC extensions.

   Note We recommend that you use Network Registrar 6.2.3.2 or later.

5. Determine the destination directory in which you want to install BAC. The default directory is */opt/CSCObpr*.

   Note We recommend that you have at least 350 MB of disk space available.

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

7. Verify that you have the necessary Network Registrar configuration files. For an example of these configuration files, see Network Registrar Configuration File Example, page A-1.

Installing in a Lab Environment

The lab installation program uses predefined default values for the installation that assume a specific network configuration. You are prompted for:

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

You can install BAC in a lab environment in two modes:

Installing from the CLI

⚠️

Caution   When installing BAC on a Solaris server, ensure that both the Solaris and Network Registrar TFTP servers are disabled. If the program detects a TFTP server running on the same computer that the DPE is being installed on, the installation terminates and error messages appear.

To install BAC in a lab environment:

Step 1   Log in to the intended BAC host as *root*.

Step 2   At the Solaris system prompt, change the 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:

    a. Change to the directory in which you will decompress and extract the installation file.

    b. Decompress the file with the *.gtar.gz* extension. Use this syntax:

        `gunzip BACC_271_SolarisK9.gtar.gz`

    c. Unpack the file with the *.gtar* extension that gunzip decompressed:

        `tar -xvf BACC_271_SolarisK9.gtar`

    The utility creates the *./BACC_271_SolarisK9* directory in which the installation program, *setup.bin*, is extracted.

    d. Change to the *./BACC_271_SolarisK9* directory:

        `cd BACC_271_SolarisK9`

Step 3   Enter this command to start the installation program:

    `> ./setup.bin -console`

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

Step 4   Press **Enter** to continue.

Step 5   The program prompts you to choose the installation type. To choose Lab installation, enter **l**.

For example:

```
Choose Installation

Choose the type of BPR installation you want to install.

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

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

Step 6   To confirm the installation type and continue, enter **y** and press **Enter**.

Step 7   The program asks if you intend to provision voice technology devices.

For example:

```
Are you going to use a device(s) that supports Packetcable voice technology?

If you are going to use Packetcable devices we need some more info.
Enter Yes to Install Packetcable and No if you don't want Packetcable
installed [No]: y
```

If yes, enter **y** and press **Enter**; otherwise, enter **n** and press **Enter**.

Step 8   To confirm your entry, press **Enter**.

Step 9   The program displays a message that it is validating Lab settings, followed by the destination directory prompt. To accept the default home directory, */opt/CSCObpr*, press **Enter**.

For example:

```
Destination Directory

Directory path for BPR_HOME

Location BPR_HOME

Installation Directory [/opt/CSCObpr]
```

Step 10   When the program asks if you want to create the default installation directory, enter **y** and press **Enter**.

For example:

```
Choosing yes will create the directory during the installation. Choosing no
will allow a different directory to be chosen.

    The directory /opt/CSCObpr does not exist. Create it? (y/n/?) [yes]
```

Step 11   Confirm the destination directory. Press **y** and **Enter** to continue.

Step 12   The Network Registrar username and password prompt appears. Enter a valid administrator username and password. Enter the password again to confirm it.

For example:

```
Cisco Network Registrar Username and Password

Enter the administrator username and password for the NR server.

Enter the username and password for the NR server to be used in the lab
installation. You must confirm the NR password.
    Network Registrar adminstrator Username [admin] admin
    Network Registrar adminstrator Password [] changeme
    Confirm Network Registrar Password [] changeme
```

Step 13 The program redisplays the administrator username, password, and password confirmation, and prompts you to confirm this information. Enter **y** and press **Enter** to continue.

> **Note** If you chose not to install the voice technology in Step 7, jump to Step 18; otherwise, continue with this procedure.

Step 14 Enter the KDC realm name. Enter the KDC Interface Address and FQDN. Ensure that you enter the realm name that you used for all DPEs in the provisioning group; press **Enter**.

For example:

```
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.
    KDC Interface Address [10.10.4.1]
    KDC FQDN [bac-test.cisco.com]
    KDC Realm [CISCO.COM]
```

Step 15 The program redisplays the KDC realm and prompts for a confirmation. Enter **y** and press **Enter**.

Step 16 The PacketCable Properties prompt appears. Enter the appropriate information and press **Enter**. Keep in mind that the KDC realm name you enter here must match the one you entered in the previous screen.

For example:

```
Enter PacketCable properties

    Enter KDC Realm Name [CISCO.COM]
    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 17 The program prompts you to confirm the PacketCable properties information. Enter **y** and press **Enter** to continue.

Step 18 Enter the shared secret password that you want to use for authentication between the BAC servers; the default password is **secret**. Press **Enter**.

For example:

```
Shared Secret Password

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

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

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

Step 19 Press **Enter** to continue.

Step 20 The program displays the installation parameters that you selected. Enter **y** and press **Enter** to install the lab software.

For example:

```
Installation Parameters

This screen shows the installation parameters that you have chosen:
```

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

Installation directory:/opt/CSCObpr

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

Step 21   When installation is complete, the Installation Summary appears. Press **Enter** to exit the program.

✎
Note   Once installation is complete, install your licenses and the chain of certificates, without which the KDC does not start.

Installing from the GUI

The lab installation prompts for:

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

⚠
Caution   When installing BAC on a Solaris server, ensure that both the Solaris and Network Registrar TFTP servers are disabled. If the program detects a TFTP server running on the same computer that the DPE is being installed on, the installation process terminates and error messages appear.

To install BAC in a lab environment from the GUI:

Step 1   Using an X-Windows client, log in to the computer on which you intend to install the BAC components, with *root* access.

Step 2   Ensure that the **gzip** and **gtar** utilities are available on your system to decompress and unpack the BAC installation file, and:

    a.   Change to the directory in which you will decompress and extract the installation file.

    b.   Decompress the file with the *.gtar.gz* extension. Use this syntax:

        gunzip BACC_271_SolarisK9.gtar.gz

    c.   Unpack the file with the *.gtar* extension that gunzip decompressed:

        tar -xvf BACC_271_SolarisK9.gtar

    The utility creates the */BACC_271_SolarisK9* directory in which the installation program, *setup.bin*, is extracted.

    d.   Change to the */BACC_271_SolarisK9* directory:

        cd BACC_271_SolarisK9

Step 3   To start the installation program, enter:

> **./setup.bin**

The installation program verifies that you have installed the correct patches on the Solaris operating system. When the verification is complete, the program displays welcome information.

Step 4   Click **Next**.

Step 5   The Choose Installation Type screen appears. Click the **Lab** radio button, then click **Next**.

Step 6   The lab installation program automatically checks for the presence of a TFTP server. If a TFTP server is detected, error messages appear and the installation terminates; otherwise, a PacketCable Panel screen appears.

Determine if you need to install the voice technology option and click:

- **Yes** if you want to install the voice technology option.
- **No** if you do not have a valid license key for this technology.

Step 7   Click **Next.**

Step 8   The Destination Directory screen appears. Enter the path of the directory in which you want to install BAC.

Step 9   Click **Next**.

Step 10   The installation program verifies that the selected installation directory exists and, if it does not, prompts you to automatically create it. Click **Yes** to continue. The installation program also confirms that the required disk space is available.

Step 11   The Network Registrar Username and Password screen appears. Enter the Network Registrar administrator username and password.

Step 12   Click **Next**.

> **Note**   If you chose not to install the voice technology from the PacketCable Panel in Step 6, jump to Step 16; otherwise, continue with this procedure.

Step 13   The Key Distribution Center Realm Name screen appears. You can choose to accept the default KDC Realm, FQDN, and interface address name; otherwise, enter the appropriate values.

Step 14   Click **Next**.

Step 15   The PacketCable Properties screen appears. Enter the appropriate information in the fields based on the following descriptions:

Field Name	Description
Kerberos Realm Name	Specifies the Kerberos realm using a unique name. This name must match the realm set at the associated components.
IP Address of Primary DHCP Server	Specifies the IP address of the primary DHCP server that the PacketCable technology uses.
IP Address of Primary DNS Server	Specifies the IP address of the primary DNS server.

Field Name	Description
IP Address of Secondary DHCP Server	Specifies the IP address of the secondary DHCP server that the PacketCable technology uses.
IP Address of Secondary DNS Server	Specifies the IP address of the secondary DNS server, if the server is being used.

Step 16   Click **Next**.

Step 17   The Shared Secret Password screen appears. Enter and confirm the shared secret password.

Step 18   Click **Next.**

Step 19   The Lab Installation Parameters screen appears. This screen identifies the values that you have entered in the previous screens. To modify any of the values:

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

   b.   Make the necessary changes.

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

Step 20   Click **Next** to install the lab version of BAC.

Step 21   Once installation is complete, the Installation Summary appears. Click **Finish**.

⚠

Caution   After installation is complete, install your licenses and the chain of certificates or the KDC does not start.

Configuring Network Registrar and a CMTS

For BAC to function, you need to set up Network Registrar client classes, policies, scopes, and selection tags. You also need to perform some configuration of CMTS devices.

✎

Note   The *NR_HOME* path that this procedure describes is defined as the Network Registrar installation directory (the default directory is */opt/nwreg2*), followed by the */regional* or */local* directory depending on the Network Registrar version that is installed on your system. For example, if you have installed:

   •   Version 6.1 or later, use */opt/nwreg2/local/* for the local cluster and */opt/nwreg2/regional* for the regional cluster.

   •   Versions lower than 6.1, use */opt/nwreg2/local*.

To configure Network Registrar and CMTS devices:

Step 1   Set up scopes on your Network Registrar server. Use this syntax:

```
# NR_HOME/usrbin/nrcmd -N username -P password -b <
BPR_HOME/cnr_ep/samples/bpr_cnr_hsd_sample_config.nrcmd
```

For example:

```
# /opt/nwreg2/local/usrbin/nrcmd -N admin -P changeme -b <
/opt/CSCObpr/cnr_ep/samples/bpr_cnr_hsd_sample_config.nrcmd
```

Note   The *BPR_HOME/cnr_ep/samples/***bpr_cnr_hsd_sample_config.nrcmd** command runs a sample Network Registrar configuration script, which defines client classes, policies, scopes, and selection tags. You must update this file to reflect the IP address settings on your network. For information about this file, see Network Registrar Configuration File Example, page A-1. For detailed information about defining client classes, policies, scopes, and selection tags, refer to the *Cisco Network Registrar User's Guide*, 6.2.1.

Step 2   Enable the cable interface or interfaces on your CMTS with the correct IP addresses and DHCP helper address.

For example:

Note   The IP addresses used here are identical to those in the sample script supplied with the BAC product. You must edit these addresses to match your own IP address range. Do not attempt to use these IP addresses in an operational environment.

```
# interface Cable3/0 qq
   ip address 192.168.5.0 255.255.255.0
   ip address 192.168.6.0 255.255.255.0 secondary
   ip address 192.168.7.0 255.255.255.0 secondary
   ip address 192.168.8.0 255.255.255.0 secondary
   no ip directed-broadcast
   no keepalive
   cable downstream annex B
   cable downstream modulation 64qam
   cable downstream interleave-depth 32
   cable downstream frequency 477000000
   cable upstream 0 frequency 26000000
   cable upstream 0 power-level 0
   no cable upstream 0 shutdown
   cable dhcp-giaddr primary
   cable helper-address 10.10.4.10
```

Note   A sample configuration script file is included with the BAC product. This file, called *cmts_sample.cfg*, resides in the *BPR_HOME/cnr_ep/samples* directory.

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

```
# ip dhcp relay information option
```

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

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

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

Post-Installation Activities

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

- Enabling a Network Registrar Spoofing DNS Server, page 5-1
- Configuring the Syslog Utility to Receive Alerts from BAC, page 5-1

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.acme.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.acme.com postmaster.dns.acme.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 acme.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 2.7.1*.

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/bpr.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  Nov 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.

C H A P T E R 6

Upgrading Broadband Access Center

This chapter describes how to upgrade Broadband Access Center for Cable (BACC) 2.6.*x* versions to BAC 2.7.1.

Table 6-1 summarizes the upgrade tasks required for BAC components for different versions.

Note This release does not support the appliance DPE-590. You can, however, upgrade the DPE-590 to BAC 2.7, which is compatible with a BAC 2.7.1 RDU.

Table 6-1 **Upgrading BAC Components**

Version	RDU	Solaris DPE	Appliance DPE-2115	Network Registrar Extension Points	KDC
BAC 2.6.*x* BAC 2.7 (Migration of RDU database required.)	Run *setup.bin*. At the end, the installer prompts you to run the migration tool.	Run the upgrade script to upgrade the DPE.	Download the upgrade file and run the DPE patch process.	Run the upgrade script to upgrade the *CNR_EP*.	Run the upgrade script to upgrade the KDC.

You should upgrade the components in the order specified below. Do not perform the upgrade in any other order as this may lead to unpredictable results.

Caution You must contact Cisco Technical Assistance Center (TAC) before undertaking a critical RDU migration and upgrade. The RDU database contains information unique to a customers' deployment and service level agreements. To migrate the RDU database, you may require updated or custom migration tools. You can find a list of TAC contacts at http://www.cisco.com/tac.

Before You Begin

To upgrade all BAC components, follow these procedures:

Step 1   Untar the upgrade file (*271upgrade.tar*) on the computer on which the BAC components reside.

For example:

```
tar -xvf 271upgrade.tar
```

The component upgrade scripts are extracted to the *patch271/bin* upgrade folder.

Step 2   To back up the RDU database files, 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-20070316-031028*. The last subdirectory (*rdu-backup-20070316-031028*) 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-20070316-031028*, meaning that the directory contains a backup that was started at 3:10:28 a.m. on March 16, 2007.

Step 3   After backup, perform a database recovery.

For additional information on using the **backupDb.sh** tool and database recovery, see the *Cisco Broadband Access Center Administrator Guide 2.7.1*.

Step 4   Verify database integrity.

> **Note**   We recommend that you run the migration process on a staging (non-production) system, instead of on a live system during RDU downtime. We do not recommend verification of database integrity during live migration, because, if the database is large, verifying the database integrity will take a long time.

To verify the database, run the **verifyDb.sh** tool on a backup of the RDU database.

For example:

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

> **Note**   To verify the database before migration, use the **verifyDb.sh** tool from the BAC installation corresponding to the version of the database.

If you find any errors in the database, contact the BAC deployment team. For more information on the **verifyDb.sh** tool, see the *Cisco Broadband Access Center Administrator Guide 2.7.1*.

Upgrading the RDU

To upgrade the RDU:

Step 1 Run the *setup.bin* file associated with a new installation of BAC. The *setup.bin* file automatically detects the previous installation.

Step 2 When the installation program prompts you to perform the database migration procedure, run the migration script as described in Migrating the RDU Database, page 6-6.

Upgrading the Solaris DPE

To upgrade the installed Solaris DPE from the 2.6.*x* and 2.7 versions to 2.7.1:

Step 1 From the upgrade folder, run:

```
./271-upgrade-dpe.sh
```

Output similar to the following appears.

```
BPR Located
BPR Home directory is /opt/CSCObpr
Current version is 2.6.2(x)
DPE Component Installed
Stopping the BPR Agent

BPR Agent is stopped.

BPR Agent stopped
Copying the Upgrade Files
Upgrading Package Information
Upgrade for BPR 2.7.1 Completed Successfully
Please start your BPR Agent to finish the upgrade Process
```

Step 2 You must manually restart the DPE agent to finish the upgrade process.

For example, from the command line, run:

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

Step 3 To verify if the version information indicates BAC 2.7.1, enter:

```
# pkgparam CSCObpr VERSION
```

Note The previous version of the file *bpr.jar* is renamed *bpr-2x.jar* and resides in the *BPR_HOME/lib* directory.

Upgrading the Hardware DPE

You may remotely patch your DPE devices, or if you have local access to these devices, you can fully reimage them. For the required reimaging procedure, refer to the *DPE-2115 Recovery CD-ROM Release Notes* that accompanied the DPE device.

> **Note** This release does not support the appliance DPE-590. You can, however, upgrade the DPE-590 to BAC 2.7, which is compatible with the BAC 2.7.1 RDU.

> **Caution** If the hardware DPE is rebooted or powered off while a patch is being applied, the device is left in an unknown state and must be completely reimaged. For reimaging instructions, refer to the *DPE-2115 Recovery CD-ROM Release Notes* that accompany the DPE device.

To upgrade the DPE component to release 2.7.1:

Step 1 Open an FTP connection to each DPE to be patched and upload the patch bundle to the DPE. See Step 3 for the appropriate DPE filename.

> **Note** When opening the FTP connection, you must enter the username **admin** and the login password chosen for the selected DPE.

Step 2 Once an FTP connection is established, change to the */incoming* directory at the FTP prompt:

```
# cd incoming
```

This command locates the patch file so that the DPE can easily find it.

Step 3 Select the upgrade file corresponding to the BAC version currently running on your DPE and use the FTP facility to copy the file to the DPE.

On a DPE-2115:

Running this BAC release...	Use this file to upgrade to BAC 2.7.1
2.7	*dpe-2115-27xto271-upgrade.bpr*
2.6.2.*x*	*dpe-2115- 262xto271-upgrade.bpr*

For example, use this command to copy the DPE-2115 upgrade file via FTP from BAC 2.6.2.*x* to BAC 2.7.1:

```
bin
put dpe-2115-262xto271-upgrade.bpr
```

Step 4 Log in to each DPE in the privilege mode, and run the **upgrade** command.

Step 5 When prompted to select the 2.7.1upgrade file, select and apply the file.

Once the upgrade is complete, the DPE reboots.

Step 6   Log in to each DPE in the privilege mode, and run the **show version** command. This command should identify the current software version running on the DPE as BAC 2.7.1.

Upgrading Network Registrar Extensions

Use this procedure to upgrade the Cisco Network Registrar extensions from BAC 2.6.*x* or 2.7 to BAC 2.7.1:

Step 1   Run the **271-upgrade-cnrep.sh** script.

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 2.7.1, enter:

```
# pkgparam CSCObpr 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 Solaris DPE upgrade with the addition of the `libbprextensions-2x.so` file.

> ✎
>
> **Note**   The previous version of the file *bpr.jar* is renamed *bpr-2x.jar* and resides in the *BPR_HOME/lib* directory.

Step 5   To verify one more time if the installation upgrade was a success, go to the *NR_HOME/extensions/dhcp/dex* directory and verify if the following 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
```

> ✎
>
> **Note**   The *NR_HOME* path defined in this step is the Network Registrar installation directory (the default directory is */opt/nwreg2*), followed by the */regional* or */local* directory depending on the Network Registrar version that you have installed on your system.

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 2.7.1 KDC requires a new license. Before you start the BAC agent, ensure that the correct license and certificates are installed.

To upgrade the KDC from BAC 2.6.*x* or 2.7 to BAC 2.7.1:

Step 1   Run the **271-upgrade-KDC.sh** script.

Step 2   Manually start the BAC agent to complete the upgrade process.

Step 3   To verify if the output information indicates BAC 2.7.1, enter:

```
# pkgparam CSCObpr VERSION
```

Step 4   Go to the *BPR_HOME/kdc/internal/bin* directory. If the upgrade was successful, the directory content appears similar to this output:

```
-r-x------ 1 root smmsp 1388 May 26 11:23 shutdownKDC.sh
-r-x------ 1 root smmsp 535 May 26 11:23 runKDC.sh
-rwxr-xr-x 1 root smmsp 1023548 May 26 11:23 kdc
```

> **Note**   Depending on the components installed, the directory content shown in this procedure may differ from that featured above.

Migrating the RDU Database

The RDU database migration script lets you migrate your RDU database from BAC 2.6.*x* or 2.7 to BAC 2.7.1.

> ⚠ **Caution**   Do not start the RDU while migration is in progress. Any attempt to restart the RDU results in a series of error messages being written into the *rdu.log* file that indicate that database migration is needed to restart the RDU.

The migration script is automatically installed when you run the BAC 2.7.1 installation program (*setup.bin*). The installation program unpacks the migration script file, **migrateDb.sh**, into the *BPR_HOME/migration* directory. When using BAC 2.6.*x* or 2.7, you must run **migrateDb.sh** to migrate the RDU database to 2.7.1.

When migrating from BAC 2.6.*x* or 2.7, ensure that you:

- Use command-line parameters to specify the file system directory for temporary storage when running the **migrateDb.sh** script. This script resides in the *BPR_HOME/migration* directory.

- Allocate the available disk space to at least match the size of the old database files. For performance reasons, we recommend that you locate this temporary directory on a disk that differs from the one on which the database and the database log files are located.

BAC 2.6.x or 2.7 Migration

To migrate your 2.6.*x* or 2.7 RDU database:

1.   Run the **migrateDb.sh** script. For example:

```
# ./migrateDb.sh
```

2. After migrating the RDU database, ensure you complete the post-migration activities depending on your BAC version, as described in Post-Migration Activities, page 6-8.

Post-Migration Activities

Start the RDU using the **bprAgent start rdu** command and observe messages about successful initialization in the *rdu.log* file.

Table 6-2 describes the activities that you must complete after migrating your BAC 2.6.*x* or 2.7 database

Table 6-2   Post-Migration Activities

BAC Version	Activities

For 2.6.x Database Migration	1. Verify the database by running the **verifyDb.sh** script, located in *BPR_HOME/rdu/internal/db/bin* directory.
	
	✎ **Note** Verification is an optional step to check database consistency. You can skip this step if shorter downtime for migration is critical.
	
	2. To prevent configuration regeneration failure, add the *giaddr* file to the RDU database from the administrator user interface. For 2.6.x versions, this file is stored on the file system. For more details, see *Cisco Broadband Access Center Administrator Guide 2.7.1*.
	
	3. After you finish adding the *giaddr* file to the RDU database, regenerate the configuration for all devices by doing the following:
	
	  a. On the Broadband Access Center main menu, click the **Devices** tab and the **Manage Devices** page appears.
	
	  b. From the Search Type drop-down list, choose **Class of Service Search**.
	
	  c. For each DOCSISModem Class of Service, click **Regenerate All**.
	
	  d. On the RDU Details page, in State under Configuration Regeneration Statistics, check if the Configuration Regeneration Service appears as RUNNING.
	
	The RDU assigns Selected Class of Service (CoS) and DHCP Criteria for a device when it generates the configuration for that device. This Selected CoS and DHCP Criteria feature was introduced in BAC 2.7.

For 2.7 Database Migration	1. Verify the database by running the **verifyDb.sh** script, located in *BPR_HOME/rdu/internal/db/bin* directory.
	
	✎ **Note** Verification is an optional step to check database consistency. You can skip this step if shorter downtime for migration is critical.
	
	2. To set up selected attributes or properties for all the devices, from the administrator user interface, assign a Selected CoS and DHCP Criteria and then regenerate the configuration for all devices by doing the following.
	
	  a. On the Broadband Access Center main menu, click the **Devices** tab and the **Manage Devices** page appears.
	
	  b. Choose the Search Type as **Class of Service Search**.
	
	  c. For each DOCSISModem Class of Service, click **Regenerate All**.
	
	  d. On the RDU Details page, in State under Configuration Regeneration Statistics, check if the Configuration Regeneration Service appears as RUNNING. For more details, see *Cisco Broadband Access Center Administrator Guide 2.7.1*.

Each time you migrate your database, information is recorded in a migration log file, which is stored in the *BPR_DATA/rdu/logs* directory. The *migration.log* file identifies the version of the database that is being migrated.

CHAPTER **7**

Setting Up a Device Provisioning Engine

A Device Provisioning Engine (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.

DPEs come with factory-installed software that enables provisioning, but you must perform some initial configuration. This chapter describes the setup procedure.

This chapter describes:

- Hardware DPE Setup Sequence, page 7-1
- Logging In, page 7-2
- Configuring a DPE for Data, page 7-3
- Configuring a DPE for Voice Technology, page 7-5
- Debugging, page 7-8

Hardware DPE Setup Sequence

Table 7-1 identifies the sequence of events for setting up a hardware DPE.

Table 7-1   DPE Setup Sequence

Step	To do this ...	Refer to...
1.	Connect the DPE to the serial port of a computer.	Connecting the DPE, page 7-2
2.	Configure and run a terminal emulation program on the computer.	Configuring and Running a Terminal Emulation Program, page 7-2
3.	Log in to the DPE and change the login and privilege mode passwords.	Logging In, page 7-2
4.	Configure the DPE for data.	Configuring a DPE for Data, page 7-3
5.	Configure the DPE to support voice technology.	Configuring a DPE for Voice Technology, page 7-5
6.	Configure the DPE to support the CableHome technology.	*Cisco Broadband Access Center Administrator Guide 2.7.1*

Connecting the DPE

Each DPE comes with a console cable. To begin setting up the DPE:

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

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

Step 3   Proceed to Configuring and Running a Terminal Emulation Program, page 7-2.

Configuring and Running a Terminal Emulation Program

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

To configure and run a terminal emulation program:

Step 1   Log in to the computer, with *root* access.

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

Step 2   On the terminal emulator, configure:

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

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

Step 3   Proceed to Logging In, page 7-2.

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

For example:

```
bac_host BACC Device Provisioning Engine

User Access Verification
```

```
Password:

bac_host>
```

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

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

The system displays the privilege mode prompt.

For example:

```
bac_host> enable
Password:
bac_host#
```

Step 4   To change the login and privilege mode password, as we recommend:

   a.   At the prompt, enter the **password** command.

   For example:

   ```
   bac_host# password password123
   ```

   b.   At the password prompt, enter the new password, and re-enter it.

   For example:

   ```
   New password:
   Retype new password:
   Password changed successfully.
   ```

✎

Note   Remember that this is your new login password. If you want to change the privilege mode password, use the **enable password** command.

Step 5   Proceed to Configuring a DPE for Data, page 7-3.

Configuring a DPE for Data

To configure a DPE, you must know the:

- Static IP address that you want to assign to the DPE.
- IP address or fully qualified domain name (FQDN) of the RDU for the DPE.
- Provisioning group or groups to which the DPE belongs.
- IP address of the default gateway on your network, if the default gateway is implemented on your network.
- Host and domain names of the DPE.

🔍

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 2.7.1*.

Note The commands pertaining to security are enabled only when connected to the DPE serial port. For more information, refer to the *Cisco Broadband Access Center DPE CLI Reference 2.7.1*.

To configure a DPE:

Step 1 Assign a static IP address and subnet mask to the first ethernet port on the DPE.

For example, to assign IP address 10.10.10.1 and the subnet mask 255.255.255.0, enter:

```
bac_host# interface ethernet 0 ip address 10.10.10.1 255.255.255.0
% OK (Requires appliance restart "> reload")
bac_host# interface ethernet 0 ip enabled true
% OK (Requires appliance restart "> reload")
bac_host# interface ethernet 0 provisioning enabled true
% OK (Requires appliance restart "> reload")
```

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

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

For example:

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

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

For example:

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

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

For example:

```
bac_host# ip default-gateway 10.10.10.1
% OK (Requires appliance restart "> reload")
```

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

For example:

```
bac_host# ip name-server 10.20.10.1
% OK
```

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

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

For example:

```
bac_host# hostname DPE1
% OK (Requires appliance restart "> reload")
```

```
bac_host# ip domain-name example.com
% OK
```

Step 7   Configure the current time on the DPE.

For example:

```
bac_host# clock set 14:52:20 30 1 2007
Tue Jan 30 14:52:20 GMT 2007

% OK
```

Step 8   Set the shared secret password to be the same as that on the RDU. This is one of the security-related commands mentioned earlier in this chapter. This command can only be run if the console is connected to the DPE serial port.

For example:

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

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

For example:

```
bac_host# reload
bac_host#
```

After you reload the DPE, you can establish a Telnet session using the IP address of the DPE. Remember to use the new login and enable password that you created in Logging In, page 7-2.

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, for a lab installation of BAC. 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 only be a single instance of each property described in these tips.

Setting Up Voice Technology

Complete these steps to set up voice technology on your DPE.

Step 1   To set the FQDN for each enabled DPE interface, enter:

```
interface ethernet 0 provisioning fqdn fqdn-value
interface ethernet 1 provisioning fqdn fqdn-value
```

🔍

Tip   dpe.properties: /server/provFQDNs=*FQDN[IP address]:port*. This setting could translate, for example, into c3po.pcnet.cisco.com[10.10.10.5]:49186.

The FQDN is sent as the SNMPEntity in DHCP Option 177 suboption 3.

For example:

```
bac_host# interface ethernet 0 provisioning fqdn dpe.cisco.com

% OK (Requires DPE restart "> dpe reload")
```

Step 2   To configure voice technology at DPE, enter:

```
packetcable registration kdc-service-key password
```

This is a protected mode security command, accessible only on the local console. The contents of this property are only visible when logged into the local console.

Note   The DPE password that you enter using this CLI command must match the corresponding password used in the Keygen utility when generating service keys for the KDC.
For a lab installation, the KDC and DPE are installed on the same host, and the installation program automatically generates a random KDC service key for both the KDC and the DPE.

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_host# packetcable registration kdc-service-key ciscosystems101

% OK (Requires DPE restart "> dpe reload")
```

Step 3   To control the choice of encryption algorithm for use during SNMPv3, enter:

```
packetcable 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 - This setting enables DES privacy.

For example:

```
bac_host# packetcable 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.

```
packetcable snmp key-material password
```

This is a protected mode security command, accessible only on the local console. The contents of this property are only visible when logged into the local console.

The default value for this command is **null**. Enter this default to turn SNMPv3 cloning off 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_host# packetcable snmp key-material ciscosystems101

% OK (Requires DPE restart "> dpe reload")
```

Step 5   Enter this command to enable the PacketCable voice technology.

packetcable enable

PacketCable provisioning is disabled at the DPE by default. If you change this property, you must reboot the DPE for the new setting to take effect. Also, you can turn voice technology on or off by entering **packetcable enable** or **no packetcable**, respectively.

💡

Tip   dpe.properties: /pktcbl/enable=enabled

For example:

```
bac_host# packetcable enable

% OK (Requires DPE restart "> dpe reload")
```

Step 6   Run the **dpe reload** command.

For example:

```
bac_host# dpe reload
dpe has been restarted
```

Controls Available

The commands described in this section provide additional configuration settings. Changing these properties on the DPE-2115 causes the change to take effect immediately, without a DPE restart.

If you are working with a lab installation, and modify any DPE property, you must restart the DPE for the change to take effect.

- **packetcable registration encryption**—This command optionally enables encryption of the MTA configuration file.

Tip   dpe.properties: /pktcbl/regsvr/configEncrypt=1

- **no packetcable registration encryption**—This command optionally disables encryption of the MTA configuration file.

Tip   dpe.properties: /pktcbl/regsvr/configEncrypt=0

- **packetcable 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

Debugging

Complete these steps to verify that your DPEs are operating properly after configuring them for operation with voice technology.

Step 1   To collect all the log, property, and network configuration files on the DPE, enter:

```
support bundle state
```

This command places the collected log files in the */outgoing* directory. From there, the bundle is accessible using FTP.

For example:

```
bac_host# support bundle state
Creating state bundle for Cisco support...
+ /outgoing/state-20060721-000340.bac
+ Adding a process listing to the support bundle...
+ Adding a network connection listing to the support bundle...
+ Adding and compressing files for support bundle...
+ Size: 1205782 bytes
```

Step 2   To check the status of both the DPE and voice technology settings, enter:

```
show dpe
```

For example:

```
bac_host# show dpe
BPR Agent is running
dpe is running

Version BAC 2.7.1 (bacc-271-L-DPE_2115_000000000000).
Caching 51970 device configs and 2 external files.
Received 312 cache hits and 0 misses.
```

```
Received 0 lease updates.
Connection status is Ready.
Sent 77 SNMP informs and 77 SNMP sets.
Received 77 MTA provisioning successful SNMP informs.
Received 0 MTA provisioning failed SNMP informs.
Running for 11 days 1 hours 59 mins 15 secs.
```

This command also checks if voice technology provisioning is running, and displays the current health of the SNMPv3 service.

Debugging

C H A P T E R 8

Uninstalling Broadband Access Center

This chapter describes how you can uninstall Broadband Access Center (BAC).

The procedure described in this chapter uninstalls the RDU, 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/CSCObpr*). The program also shuts down and removes these process, 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 transaction logs directories under */var/CSCObpr*. These files must be manually removed. (Subsequent sections describe how to delete these files.) But if you chose to install the home, data, and database transaction logs in the same location, as in the case of a lab installation, the uninstallation program warns you that continuing the uninstallation removes the data and log files. Also, the program does not remove any files found in the Network Registrar directory.

⚠️
Caution If you uninstall BAC after configuring your Network Registrar servers to use BAC extensions, your network will no longer function correctly. You must uninstall BAC extensions in Network Registrar to completely uninstall the BAC program.

This chapter describes:

Uninstalling BAC

This section describes the procedures to uninstall BAC.

After uninstalling BAC, manually remove the Data and Database Transaction Logs directories. See Post-Uninstallation Task, page 8-4.

You can uninstall BAC in two modes:

Uninstalling from the CLI

⚠️
Caution   If you are uninstalling BAC from a lab installation, the database is automatically deleted based on your confirmation. To prevent the accidental or unplanned deletion of the database, copy or back up the database files and log files as described in the *Cisco Broadband Access Center Administrator Guide 2.7.1*.

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.

✎
Note   The *NR_HOME* path that this procedure describes is defined as the Network Registrar installation directory (the default directory is */opt/nwreg2*), followed by the */regional* or */local* directory depending on the Network Registrar version that is installed on your system. For example, if you have installed:

- Version 6.1 or later, use */opt/nwreg2/local/* for the local cluster and */opt/nwreg2/regional* for the regional cluster.

- Versions lower than 6.1, use */opt/nwreg2/local*.

a. To uninstall the BAC extensions from your Network Registrar configuration, enter:

```
# NR_HOME/usrbin/nrcmd -N admin -P changeme -b <
BPR_HOME/cnr_ep/bin/bpr_cnr_disable_extpts.nrcmd
```

b. To reload your DHCP server, enter:

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

Alternatively, enter:

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

c. To remove the BAC extensions from the Network Registrar extensions directory, enter:

```
# rm -f NR_HOME/extensions/dhcp/dex/libbprextensions.so
```

Step 3   At the CLI prompt, enter:

```
# BPR_HOME/_uninst/uninstall.bin -console
```

✎
Note   If you are uninstalling a lab installation, the program prompts you to confirm if you want to delete the BAC database, which resides in the home directory in a lab environment. The home directory is, by default, */opt/CSCObpr*. To continue with the uninstallation, enter **y** and press **Enter**.

The following information appears:

```
Welcome to the Uninstallation Program

Press Enter to uninstall Cisco Broadband Provisioning Registrar from your system.

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

Step 4   Press **Enter** to start uninstalling.

Step 5   When uninstallation ends, these messages appear:

```
Cisco Broadband Provisioning Registrar was Uninstalled

Cisco Broadband Provisioning Registrar files were uninstalled successfully.

    Press Enter to finish:
```

Press **Enter** to exit the program.

Uninstalling from the GUI

To uninstall BAC from the graphical user interface:

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.

✎ **Note**   The *NR_HOME* path that this procedure describes is defined as the Network Registrar installation directory (the default directory is */opt/nwreg2*), followed by the */regional* or */local* directory depending on the Network Registrar version that is installed on your system. For example, if you have installed:

- Version 6.1 or later, use */opt/nwreg2/local/* for the local cluster and */opt/nwreg2/regional* for the regional cluster.

- Versions lower than 6.1, use */opt/nwreg2/local*.

a.   To uninstall the BAC extensions from your Network Registrar configuration, enter:

```
# NR_HOME/usrbin/nrcmd -N admin -P changeme -b <
BPR_HOME/cnr_ep/bin/bpr_cnr_disable_extpts.nrcmd
```

b.   To reload your DHCP server:

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

Alternatively, enter:

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

c.   To remove the BAC extensions from the Network Registrar extensions directory, enter:

```
# rm -f NR_HOME/extensions/dhcp/dex/libbprextensions.so
```

Step 3 Navigate to the home directory where the BAC program is installed. The default directory is */opt/CSCObpr.*

Step 4 At the CLI prompt, change to the *_uninst* directory and run the *uninstall.bin* script.

✎

Note If you are uninstalling a lab installation, a warning appears that you are about to delete the BAC database, which resides in the home directory in a lab environment. To continue with the uninstallation, click **Yes**.

Step 5 The welcome screen of the uninstallation program appears. Click **Next**.

Step 6 The uninstallation program begins removing BAC files. When uninstallation is complete, a message appears indicating successful uninstallation. Click **Finish** to exit the uninstallation program.

Post-Uninstallation Task

Once you have uninstalled BAC, you must manually remove the Data and Database Transaction Logs directories.

To remove these directories:

Step 1 Log in as *root*.

Step 2 Remove the Data and the Database Transaction Logs. (The default directory for both is */var/CSCObpr.*)

For example, enter:

```
# rm -rf /var/CSCObpr
```

The data and the database transaction logs directories are deleted.

Network Registrar Configuration File Example

This appendix describes the sample configuration files included with this installation. 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 exists for DOCSIS modems and computers, while another is available for DOCSIS modems and PacketCable MTAs.

Sample Script for DOCSIS Modems and Computers

This sample configuration nrcmd script (**bpr_cnr_hsd_sample_config.nrcmd**) is used for a high-speed data deployment of DOCSIS modems and computers in a multiple-host configuration with failover protection. It is installed in 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 Network Registrar **nrcmd** program, enter:

```
# NR_HOME/usrbin/nrcmd -N username -P password -b < bpr_cnr_hsd_sample_config.nrcmd
```

- *NR_HOME*—Identifies the Network Registrar installation directory (the default directory is */opt/nwreg2*), followed by the */regional* or */local* directory depending on the Network Registrar version that is installed on your system.
- *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/usrbin/nrcmd -N username -P password -b < bpr_cnr_pktcbl_sample_config.nrcmd
```

- *NR_HOME*—Identifies the Network Registrar installation directory (the default directory is */opt/nwreg2*), followed by the */regional* or */local* directory depending on the Network Registrar version that is installed on your system.
- *username*—Identifies the username
- *password*—Identifies the password

Installation Worksheet

While installing Cisco Broadband Access Center (BAC), the installation program prompts you 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 (*BPR_HOME*)	Root directory in which to install BAC components	*/opt/CSCObpr*	
Data directory (*BPR_DATA*)	Root directory in which to install the data directory for BAC components	*/var/CSCObpr*	
Database transaction logs directory (*BPR_DBLOG*)	Root directory in which to install the transaction logs for BAC components	*/var/CSCObpr*	
RDU host	Hostname of the server on which you install the RDU	None	
RDU port number	Port number through which the RDU communicates with other BAC components	49187	
Shared secret password	Password that BAC servers on your network use as a token to authenticate communication with one another	secret	
Network Registrar extensions point 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	
Port number of administrator user interface **Note** BAC does not prompt you for this value during installation.	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	8443	

Table B-1   BAC Installation Parameters (continued)

Prompt	Description	Default Value	Your Value
Administrator user interface user password	Password using which you access the BAC administrator user interface **Note** BAC does not prompt you for this value during installation.	changeme	
	Password using which you access the Network Registrar web UI	changeme	
DPE password **Note** BAC does not prompt you for this value during installation.	Password using which you log in to the DPE	changeme	
	Password using which you access the DPE in the enabled mode	changeme	

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