Prime Cable Provisioning Architecture

This chapter describes the basic Prime Cable Provisioning architecture, and the components involved in Prime Cable Provisioning.

Regional Distribution Unit

The RDU is the primary server in the Prime Cable Provisioning setup. You must install the RDU on a server running the Solaris or Linux operating system.

The functions of the RDU include:

- Managing device configuration generation
- Generating configurations for devices and distributing them to DPEs for caching
- Synchronizing with DPEs to keep device configurations up to date
- Processing API requests for all Prime Cable Provisioning functions
- Managing the Prime Cable Provisioning system

The RDU supports the addition of new technologies and services through an extensible architecture.

Cisco Prime Cable provisioning is deployed in High Availability (HA) environment to provide an error-free and continued provisioning service. The HA environment involves setting up the critical components in a failover pair. This ensures that the service continuity is maintained even if a critical component fails to respond, and also helps in disaster recovery. For a medium or large scale setup, it is required to have a redundant service to adhere to the Service Level Agreements (SLAs) and Service Level Objectives (SLOs). The RDU redundancy in Prime Cable Provisioning facilitates setting up RDU in HA environment with a two node failover pair. If the primary RDU node fails or becomes unresponsive, the secondary RDU node controls the provisioning service. For more information on RDU redundancy, see the *Cisco Prime Cable Provisioning 5.3 User Guide*.

Device Provisioning Engine

The Device Provisioning Engine (DPE) communicates with CPE to perform provisioning and management functions.

The RDU generates DHCP instructions and device configuration files, and distributes them to the relevant DPE servers. The DPE caches these DHCP instructions and device configuration files. The DHCP instructions are then used during interactions with the Network Registrar extensions, and configuration files are delivered to the device through the TFTP service.

Prime Cable Provisioning supports multiple DPEs. You can use multiple DPEs to ensure redundancy and scalability.

The DPE handles all configuration requests, including providing configuration files for devices. It is integrated with the Network Registrar DHCP server to control the assignment of IP addresses for each device. Multiple DPEs can communicate with a single DHCP server.

In the DPE, the configurations are compressed using Delta Compression technique to enhance the scalability of the DPE to support up to six million devices.

The DPE manages these activities:

- Synchronizes with the RDU to retrieve the latest configurations for caching.
- Generates last-step device configuration (for instance, DOCSIS timestamps).
- Provides the DHCP server with instructions controlling the DHCP message exchange.
- Delivers configuration files through TFTP.
- Integrates with Network Registrar.
- Provisions voice-technology services.

You must install the DPE on a server that runs the Solaris or Linux operating system. Configure and manage the DPE from the CLI, which you can access locally or remotely through Telnet. For specific information on the CLI commands that DPE supports, see the *Cisco Prime Cable Provisioning 5.3 DPE CLI Reference*.

Note   During installation, you must configure each DPE for the:

- Name of the provisioning group to which the DPE belongs. This name determines the logical group of devices that the DPE services.
- IP address and port number of the RDU.

For more information on DPE, see the *Cisco Prime Cable Provisioning 5.3 User Guide*.

Provisioning Group

A provisioning group is designed to be a logical (typically geographic) grouping of servers that usually consists of one or more DPEs and a failover pair of DHCP servers. Each DPE in a given provisioning group caches identical sets of configurations from the RDU, thus enabling redundancy and load balancing. As the number of devices grows, you can add additional provisioning groups to the deployment.

Note   The servers for a provisioning group are not required to reside at a regional location. They can just as easily be deployed in the central network operations center.

Provisioning groups enhance the scalability of the Prime Cable Provisioning deployment by making each provisioning group responsible for only a subset of devices. This partitioning of devices can be along regional groupings or any other policy that the service provider defines. To scale a deployment, the service provider can:

- Upgrade existing DPE server hardware

- Add DPE servers to a provisioning group
- Add provisioning groups

To support redundancy and load sharing, each provisioning group can support any number of DPEs. As the requests come in from the DHCP servers, they are distributed between the DPEs in the provisioning group and an affinity is established between the devices and a specific DPE. This affinity is retained as long as the DPE state within the provisioning group remains stable.
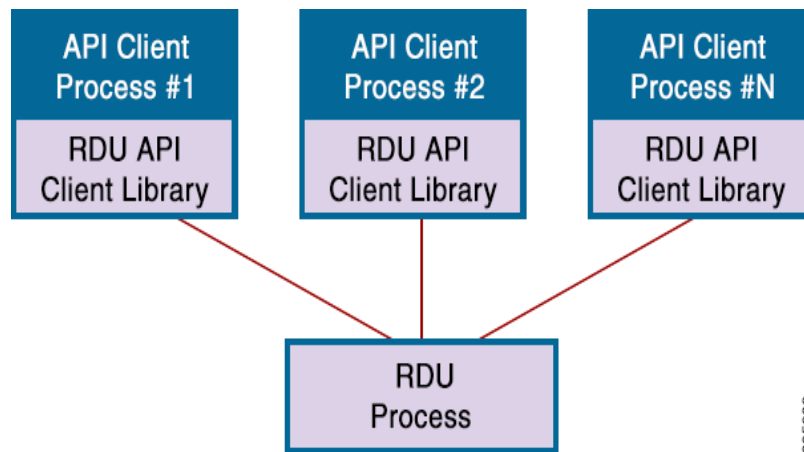
For more information on provisioning groups, see the *Cisco Prime Cable Provisioning 5.3 User Guide*.

Client API

The client API provides total client control over Prime Cable Provisioning capabilities. The API enables the client on a remote host to communicate with the RDU.

The API client library exposes the client to a single logical interface. For information on the objects and functions of this interface, see the API Javadocs in the Prime Cable Provisioning installation directory. Figure 2-1 shows three remote clients accessing the RDU using the API client library.

Figure 2-1   Embedded Client Library

The API client library is packaged in the bpr.jar, bacbase.jar, and bac-common.jar files, located at *BPR_HOME/lib*, where *BPR_HOME* refers to the home directory on which you install Prime Cable Provisioning.

> **Note**   For successful communication between Prime Cable Provisioning RDU and 4.x and 4.x.x clients, ensure that the bpr.jar, bacbase.jar, and bac-common.jar files are copied to the 4.x and 4.x.x API client setup. These jars are loaded to the appropriate classpaths. We recommend that you use Java version 1.6.0_32 or later to support the client API in Prime Cable Provisioning.

Cisco Prime Network Registrar

Cisco Prime Network Registrar provides the DHCP and DNS functionality in Prime Cable Provisioning. The DHCP extension points on Prime Network Registrar integrate Prime Cable Provisioning with Prime Network Registrar. Using these extensions, Prime Cable Provisioning examines the content of DHCP requests to detect device type, manipulates the content according to its configuration, and delivers customized configurations for devices that it provisions.

For more information on Cisco Prime Network Registrar, see the *Cisco Prime Network Registrar 8.x User Guide*.

✎ **Note**   We recommend you to use the CPNR 8.x version, however CNR 7.2.x is also supported with Cisco Prime Cable Provisioning 5.3.

Key Distribution Center

The Key Distribution Center (KDC) authenticates PacketCable MTAs and also grants service tickets to MTAs. As such, it must check the MTA certificate, and provide its own certificates so that the MTA can authenticate the KDC. It also communicates with the DPE (the provisioning server) to validate that the MTA is provisioned on the network.

The KDC requires a license to function. Obtain a KDC license from your Cisco representative and install it in the correct directory.

You must install the KDC on a server that runs the Solaris or Linux operating system.

The certificates used to authenticate the KDC are not shipped with Prime Cable Provisioning. You must obtain the required certificates from Cable Television Laboratories, Inc. (CableLabs), and the content of these certificates must match those that are installed in the MTA.

During PCP installation, the KDC has several default properties that are populated into the kdc.ini properties file located at BPR_HOME/kdc/solaris and BPR_HOME/kdc/linux directories.You can edit this file to change values as operational requirements dictate.

The KDC also supports the management of multiple realms. For more information on KDC, see the *Cisco Prime Cable Provisioning 5.3 User Guide*.

Prime Cable Provisioning Process Watchdog

The Prime Cable Provisioning process watchdog is an administrative agent that monitors the runtime health of all Prime Cable Provisioning processes. This watchdog process ensures that if a process stops unexpectedly, it is automatically restarted. One instance of the Prime Cable Provisioning process watchdog runs on every system which runs Prime Cable Provisioning components.

You can use the Prime Cable Provisioning process watchdog as a command-line tool to start, stop, restart, and determine the status of any monitored processes.

For more information on how to manage the monitored processes, see the *Cisco Prime Cable Provisioning 5.3 User Guide*.

SNMP Agent

Prime Cable Provisioning provides basic SNMP v2-based monitoring of the RDU and DPE servers. The Prime Cable Provisioning SNMP agents support SNMP informs and traps, collectively called notifications.

You can configure the SNMP agent:

- On the RDU, using the SNMP configuration command-line tool or from the API, see the *Cisco Prime Cable Provisioning 5.3 User Guide*.

- On the DPE, using the snmp-server CLI commands, see the *Cisco Prime Cable Provisioning 5.3 DPE CLI Reference*.

Provisioning Web Services (PWS)

Provisioning Web Services (PWS) is a SOAP based web service that supports provisioning operations. A separate web server is installed in the network infrastructure to host PWS.

For more information on PWS, see Chapter 8, "Provisioning Web Services (PWS)".

Web User Interface

The Prime Cable Provisioning administrator user interface is a web-based application for central management of the Prime Cable Provisioning system. You can use this system to:

- Configure global defaults
- Define custom properties
- Add, modify, and delete Class of Service
- Add, modify, and delete DHCP Criteria
- Add, modify, and delete devices
- Group devices
- View server status and server logs
- Manage roles, user groups, and domains
- Enable, disable, pause, and resume CRS
- View, filter, and delete any CRS request

For more information on Prime Cable Provisioning administrator user interface, see the *Cisco Prime Cable Provisioning 5.3 User Guide*.