Overview of Prime Cable Provisioning

Cisco Prime Cable Provisioning automates the tasks of provisioning and managing customer premises equipment (CPE) in a broadband service-provider network.

With the high-performance capabilities of Prime Cable Provisioning, you can scale the product to suit networks of virtually any size, even those with millions of devices. It also offers high availability, which is made possible by the product's distributed architecture and centralized management.

Prime Cable Provisioning is designed to handle the rapid growth of service providers. It targets broadband service providers (including multiple service operators), internet, and voice service providers who want to deploy IP data, voice, and video on hybrid fiber and coaxial cable networks.

Prime Cable Provisioning provides such critical features as redundancy and failover. It can be integrated into new or existing environments through a provisioning application programming interface (API) that lets you control how Prime Cable Provisioning operates. You can use the provisioning API to register devices in Prime Cable Provisioning, assign device configurations, and configure the entire Prime Cable Provisioning system.

Supported Devices and Technologies

Prime Cable Provisioning supports provisioning and managing of:

- IPv4 and IPv6 devices, which include:

  - Cable modems and STBs compliant with DOCSIS 1.0, 1.1, 2.0, 3.0, and 3.1.

  - Embedded Multimedia Terminal Adapters (eMTAs) compliant with PacketCable 1.0, 1.5 and 2.0. Only PacketCable 2.0 supports IPv6 devices.

  - Dual-stack capable CableLabs devices (DOCSIS 3.0, 3.1 or PacketCable 2.0 compliant)

  - Devices compliant with CableHome 1.0

  - Computers

  - Set-top boxes (STBs)

  - eRouter 1.0

- Remote PHY Device (RPD)

- Any STB compliant with CableLabs OpenCable Application Platform.

- Variants of eSAFE (embedded Service/Application Functional Entities) devices, such as mixed-IP mode PacketCable Multimedia Terminal Adapters (MTAs). A mixed-IP mode MTA is an eSAFE device that consists of an eCM (embedded Cable Modem) and an eMTA. This class of devices embeds additional functionality with cable modems, such as packet-telephony, home networking, and video.

- E-DVA (Embedded DVA) device, which is a single physical device embedded with an eDOCSIS-compliant eCM and a PacketCable 2.0 eDVA (embedded Digital Voice Adaptor).

Prime Cable Provisioning facilitates support for many technologies to provide provisioning services for your network. These technologies include:

DOCSIS High-Speed Data

The Data Over Cable Service Interface Specification (DOCSIS) defines functionality in cable modems that are involved in high-speed data distribution over cable television system networks. Using this feature, Multiple Systems Operators (MSOs) can provide a variety of services through an "always-on" Internet connection. These services include broadband Internet connectivity, telephony, real-time interactive gaming, and video conferencing.

Prime Cable Provisioning supports DOCSIS 1.0, 1.1, 2.0, 3.0, and 3.1.

Prime Cable Provisioning also supports dual-stack provisioning of devices that are compliant with DOCSIS 3.0, and 3.1.

PacketCable Voice Services

PacketCable voice technology enables the delivery of advanced, real-time multimedia services over a two-way cable network. PacketCable is built on top of the infrastructure supported by cable modems to enable a wide range of multimedia services such as IP telephony, multimedia conferencing, interactive gaming, and general multimedia applications.

Using PacketCable voice technology, you can provide additional services, such as basic and extended telephony services, in a broadband network. For this purpose, PacketCable is an efficient and cost-effective option.

Prime Cable Provisioning supports the Secure and Basic variants of PacketCable and both these modes are much the same, except for reduced security found in the Basic variant. Prime Cable Provisioning supports PacketCable 1.0, 1.5, and 2.0 specifications.

Euro-PacketCable services are the European equivalent of the North American PacketCable standard. The only significant difference between the two is that Euro-PacketCable uses different MIBs.

CableHome

Non-secure CableHome 1.0 provisioning (hereafter referred to as home networking technology) is built on top of the existing DOCSIS standard and supports a 'plug-and-play' environment for residential broadband connectivity. This form of home networking technology encompasses a DOCSIS home access device with support for CableHome. This device is known as Portal Services and is considered to be the home's entry point.

eRouter 1.0

The eRouter 1.0 device will provide networking functionality together with an embedded DOCSIS eCM in an eDOCSIS device. The primary function of the eRouter 1.0 device is to allow subscribers to connect multiple CPE devices to the operator provided DOCSIS high-speed Internet service. DOCSIS specifications allow subscribers to directly connect multiple CPE devices to the cable modem; however, that requires operators to provide IP provisioning to each of the CPE devices. Depending on which IP Protocols are enabled, the eRouter allows provisioning of IPv4 CPEs, IPv6 CPEs, or Dual Stack (IPv4 and IPv6) CPEs simultaneously.

eRouter Initialization:

The eRouter operates in any one of the following three modes:

- IPv4 Protocol Enabled

- IPv6 Protocol Enabled

- Dual IP Protocol Enabled

The eRouter can also be set to 'Disabled' mode, which turns the eRouter into a bridging device. The eRouter must support all the three modes of operations along with the ability to be set to 'Disabled' mode. The eRouter, by default will be in 'Dual IP Protocol Enabled' mode

RPD

Remote PHY technology allows a CMTS to support an IP-based digital HFC plant. This technology uses a Layer 3 pseudowire between a CCAP Core and a series of Remote PHY devices (RPD). It separates the PHY from CCAP device, and places it in the node. And the PHY technology mainly migrates the analog signals to digital signals which improves the performance. RPDs are commonly located at optical node device at the junction of the fiber and coax plants. Prime Cable Provisioning provides support for managing the RPD devices.

Supported Standards

Prime Cable Provisioning complies with these applicable Requests for Comments (RFCs), protocols, standards, and Internet Engineering Task Force (IETF) drafts:

- DHCPv6—Complies with RFC 3315 (DHCPv6 specification), 3633 (IPv6 Prefix Options), 3736 (Stateless DHCP Service for IPv6), 4014 (Remote Authentication Dial-In User Service–RADIUS–Attributes Suboption for the Dynamic Host Configuration Protocol–DHCP–Relay Agent Information Option), 4580 (Relay Agent Subscriber-ID Option), 4649 (Relay Agent Remote-ID Option), and 4704 DHCPv6 Client Fully Qualified Domain Name (FQDN) Option.

- IPv6—Complies with RFC 2460 (IPv6 specification), 2461 (Neighbor Discovery Protocol), 2462 (Stateless Address Autoconfiguration), 2463 (Internet Control Message Protocol–ICMP), 3513 (Addressing Architecture).

- IPv4 and IPv6 interoperability—Complies with RFC 4038 (Application of IPv6 Transition) and 4472 (Operational Issues and Considerations with IPv6 DNS).

- TFTP and ToD servers—Complies with RFC 868 (Time Protocol), 2348 and 2349 (TFTP Blocksize Options), 1350 (TFTP Revision 2 protocol) and 2347 (TFTP Option Extension).

Additionally, Prime Cable Provisioning complies with these applicable CableLabs standards:

- Cross Project

    - CL-SP-CANN-I14-160317

    - CL-SP-CANN-DHCP-Reg-I13-160317

- DOCSIS

    - eDOCSIS

        - CM-SP-eDOCSIS-I28-150305

    - DOCSIS 2.0

        - CM-SP-RFIv2.0-C02-090422

        - CM-SP-DOCSIS2.0-IPv6-I07-130404

    - DOCSIS 3.0

        - CM-SP-MULPIv3.0-I29-151210

        - CM-SP-SECv3.0-I15-130808

        - CM-SP-OSSIv3.0-I28-151210

    - DOCSIS 3.1

        - CM-SP-MULPIv3.1-I09-160602

        - CM-SP-SECv3.1-I 06-160602

        - CM-SP-CM-OSSIv3.1-I07-160602

        - CM-SP-MULPIv3.1-I20-200407

        - CM-SP-SECv3.1-I09-200407

        - CM-SP-CM-OSSIv3.1-I17-200610

        - CM-SP-CCAP-OSSIv3.1-I18-200610

        - CM-SP-PHYv3.1-I17-190917

    - Business Services over DOCSIS

        - CM-SP-L2VPN-I15-150528

- DOCSIS Set-top Gateway (DSG)
    - CM-SP-DSG-I24-1-30808

- DOCSIS Provisioning of EPON (DPoE)
    - DPoE 1.0
        - DPoE-SP-MULPIv1.0-I10-150319
        - DPoE-SP-OSSIv1.0-I08-140807
        - DPoE-SP-SECv1.0-I06-140807

    - DPoE 2.0
        - DPoE-SP-MULPIv2.0-I09-151210
        - DPoE-SP-OSSIv2.0-I08-151210
        - DPoE-SP-SECv2.0-I04-140807

- PacketCable
    - PacketCable 1.5
        - PKT-SP-PROV1.5-I04-090624
        - PKT-SP-SEC1.5-I03-090624

    - PacketCable 2.0
        - PKT-SP-EUE-PROV-C01-140314
        - PKT-SP-EUE-DATA-C01-140314
        - PKT-SP-UE-PROV-C01-140314
        - PKT-SP-UE-DATA-C01-140314
        - PKT-SP-RST-EUE-PROV-C01-140314
        - PKT-SP-RST-UE-PROV-C01-140314
        - PKT-SP-RST-E-DVA-C01-140314

- OpenCable
    - OC-SP-HOST2.1-CFR-I17-130418

- CableHome
    - CH-SP-CH1.0-C01-060728
    - CH-SP-CH1.1-C01-060728

- eRouter 1.0

- CM-SP-eRouter-I18-160317

- Remote PHY Device (RPD)

- CM-SP-R-PHY-I05-160923

Key Features and Benefits

The following table outlines the important features and benefits of Prime Cable Provisioning.

Table 1: Prime Cable Provisioning Features and Benefits

Feature	Benefit
Easy integration with back-end systems	• The Prime Cable Provisioning Java API, which can be used to perform all provisioning and management operations. It also provides easy integration to customer OSS, billing, or workflow and mediation software. • The Prime Cable Provisioning publishing extensions, which are useful in writing RDU data into another database. • The SNMP agent, which simplifies integration for monitoring Prime Cable Provisioning. • The DPE command-line interface (CLI), which allows you to configure the DPE to suit your requirements via a "services" interface, and which simplifies local configuration when you use the CLI to copy and paste commands. • The PWS (Provisioning Web Services), which helps in easy interactions for device provisioning functions.
Improved management	• Provisioning group capabilities—Allows you to control the device type support that must be enabled for the provisioning groups in your deployment. • Property hierarchy—For better flexibility, Prime Cable Provisioning property hierarchy allows you to define properties at different levels.

Feature	Benefit
Increased security	• User-configurable IP addresses and ports to provide multipathing, multi-interface binding, and firewall compatibility. • DOCSIS 3.0 for the Extended CMTS MIC Configuration Setting, enabling Prime Cable Provisioning to use advanced hashing techniques to detect unauthorized modification or corruption of the cable modem configuration file. • A password policy to access the RDU from the Admin UI. The Radius authentication provides increased security by authenticating the users accessing the network services via the Radius server, using the Radius standard protocol. • Secure access, enhanced Admin UI access over HTTPS.
Enhanced troubleshooting and diagnostics	• Device troubleshooting to provide detailed records of device interactions with Prime Cable Provisioning servers using the IDs of the devices designated for troubleshooting. Using this feature, you can focus on a single device, identified by its MAC address or its DHCP Unique Identifier (DUID), and use that diagnostic information for further analysis. • Server troubleshooting using diagnostics scripts to collect performance statistics—down to a specific type of statistic—for the servers. Prime Cable Provisioning provides many scripts to collect server and system configuration data that may be required for support escalations. You can use the bundleState script to collect the diagnostics data.
DOCSIS 3.0, 3.1 and IPv6 support	DOCSIS 3.0, 3.1 channel bonding allows increased data speed for subscribers. Support for IPv4 and IPv6 cable modems and IPv4/IPv6 mixed device environment, along with dual-stack capability.
Distributed architecture with high availability and disaster recovery	Offers true scalability, failover, and high reliability to manage a growing subscriber base while helping to ensure minimum subscriber service disruption. Allows a simple way to extend provisioning to additional subscribers and new markets, and dramatically simplifies capacity upgrade and lowers maintenance costs. Distributed provisioning engines allow you to put them in different data centers for disaster recovery.
Integrated Kerberos Protocol server (KDC) for PacketCable voice service provisioning	Provides a single platform with all the necessary security components for PacketCable provisioning.
Templates and MACRO for better flexibility	You can include an existing template and use MACRO for better flexibility in managing template parameters and in automating the template deployment.
Technology extensions	Provides an easy means to extend this single platform to provision new devices and technologies to meet changing network and subscriber requirements.

Feature	Benefit
PacketCable 2.0 and IPv6 support	Supports PacketCable 1.0, 1.1, 1.5 and 2.0 specifications for complete end-to-end IP voice service provisioning and meets all PacketCable security specifications. PacketCable 2.0 supports device provisioning in IPv6 mode.
Dynamic file generation	Offers a means to build unique files for individual subscriber devices to meet needs of tiered service provisioning and true IP voice requirements.
Safe failover	High uptime and service reliability through DPE and DHCP failover as well as TFTP redundancy.
Enhanced support for complex extensions and improved caching	Native support for 64-bit processes allows Prime Cable Provisioning to improve memory management and provide enhanced support for complex extensions. In addition, improved caching increases the performance and reliability of the overall solution.
RDU High Availability (RDU HA)	In addition to DPE failover, Prime Cable Provisioning supports RDU HA for RHEL and CentOS based deployments for enhanced reliability. The RDU is the primary server in the Prime Cable Provisioning system. It performs the following functions: • Manages the generation of all configurations • Maintains the authoritative database • Represents the central point through which all API requests must pass • Supports external clients, OSSs, and other provisioning functions through the provisioning API
Fine-grained RBAC	As the cable service provider organization evolves, more people within the organization need easy access to subscriber and device data that is present in the Prime Cable Provisioning solution; however, security considerations must be taken into account when providing access to sensitive data. With fine-grained access controls, system administrators no longer need to compromise security with the need for greater access. The new RBAC model allows administrators to create custom roles (user groups) and assign operational privileges to custom roles. Administrators can create new domains and partition data by regions (devices, classes of service, provisioning groups, and more). RBAC is supported for the RDU API, PWS API, and the DPE command-line interface (CLI).
SSL for RDU API and provisioning group communication	SSL support for the RDU API helps ensure that sensitive information remains encrypted and secure between the Prime Cable Provisioning solution and the applications with which it integrates. In addition, administrators can enable SSL encryption among the RDU, DPE and Cisco Prime Network Registrar DHCP extensions.
Simple Object Access Protocol (SOAP)/Representational State Transfer (RESTful)-based web services API	In addition to a Java API, a web services API provides flexibility to integrate various OSS/BSS applications with the Prime Cable Provisioning solution.

What's New in This Release

This release, supports the following new features and enhancements:

- **Hashed SNMP Community String Based on Device IP Address**

  Prime Cable Provisioning 6.3 supports configuring SNMP community string via template or groovy files and can optionally be overridden at DPE into an IP-based hashed string on a per-DOCSIS-device basis.

- **dpe event kafka CLI Command**

  Prime Cable Provisioning 6.3 supports configuring Kafka broker details for DPE event publishing via DPE CLI using the command **dpe event kafka**.

- **Promiscuous Mode for Devices Behind Unregistered Cable Modem**

  Prior to Prime Cable Provisioning 6.3, promiscuous access can be enabled for devices behind a registered DOCSIS modem only, but Prime Cable Provisioning 6.3 supports promiscuous access which can be enabled for devices behind unregistered DOCSIS modem.

- **RDU HA Support on CentOS 8.3**

  Prime Cable Provisioning 6.3 supports RDU HA on CentOS 8.3.

- **REST PWS Supports Load Balancer**

  Prime Cable Provisioning 6.3 supports REST PWS Load Balancer.

- **REST PWS Get Operation Enhancements**

  Prime Cable Provisioning 6.3 supports the following get operations:

  - *getAllCNRs*
  - *getAllDPEs*
  - *getAllProvGroups*