Cisco Prime Cable Provisioning 5.0

Cable service providers face tremendous challenges in keeping pace with the rapid evolution of residential subscriber services. In light of intense market competition and increased consumer choice in broadband services (DSL, cable, 3G/4G, fiber, and satellite), cable service providers need to innovate continually to retain market share and grow revenue. This means quickly rolling out competitive differentiated products and services such as DVR services and interactive IP set-top boxes, as well as providing a high quality of experience for end users.

As these cable subscriber services are becoming more complex, cable networks also are increasing in size and architectural complexity. Management systems that simplify and speed the tasks of operating the network and provisioning cable subscriber services are essential.

In addition, cable service providers are looking for ways to lower the support and other operating costs associated with device growth and new service deployments. In part, this device growth is being driven by the introduction into the market of new DOCSIS®, PacketCable™, and OpenCable™ standards and new technologies like IPv6, Ethernet passive optical network (EPON), and the associated standard, DOCSIS Provisioning of EPON (DpoE™). Cable service providers need an automated provisioning and management tool to support these new standards.

Product Overview

Cisco Prime™ Cable Provisioning is a distributed, highly scalable, and reliable solution for management of cable subscriber devices and automated flow-through provisioning of the subscriber services that run on those devices.

A centralized platform allows cable service providers to control and configure network devices located at the customer premises, including DOSCIS residential home gateways, cable modems, set-top boxes, and media termination adapters (MTAs). Cisco Prime Cable Provisioning automatically recognizes devices, assigns the appropriate class of service, dynamically creates and generates device configuration files, and activates subscribers - all at extremely fast speeds. This single device management platform supports multiple technologies including DOCSIS, PacketCable, DPoE, OpenCable and satellite.

Cisco Prime Cable Provisioning plays a critical role in delivering subscriber revenue-generating services and managing the devices over which these services are delivered. The solution is able to generate thousands of configuration files per minute - important after a network outage. It is also able to grow with the business and can easily add hundreds of thousands of new subscribers, helping accelerate revenue when new products and services are being introduced.

Cisco Prime Cable Provisioning automates the configuration and provisioning of subscriber devices based on the service provider's business policies. The solution allows cable service providers to implement either one or both of the following workflow models:

- Preprovisioning: Devices are assigned to subscribers and recorded in advance in the provisioning application. When subscribers plug them in, Cisco Prime Cable Provisioning automatically assigns the appropriate service level and activates them.
- Autoprovisioning: When subscribers self-register for a service, or when the service is installed by the technician, subscriber devices are captured and recorded in the provisioning application. Upon completion Cisco Prime Cable Provisioning configures the device and activates the service.

Cisco Prime Cable Provisioning supports both static and dynamic provisioning of configuration files. During static provisioning, an administrator enters static configuration files into the Cisco Prime Cable Provisioning system. These configuration files are then delivered through Trivial File Transfer Protocol (TFTP) to the specific device to generate its configuration. This option is best suited for networks with relatively few service offerings.

Dynamic provisioning of configuration files includes the use of templates or Groovy scripts. Templates are text files containing DOCSIS or PacketCable options and values that, when used with a particular class of service, provide dynamic file generation. In addition to templates, Cisco Prime Cable Provisioning provides Groovy scripting for dynamically generating configuration files for any CableLabs® standards supported by the solution. Groovy scripts are better suited for implementing more sophisticated business logic when compared to templates. The Groovy scripting interface allows access to the discovered Dynamic Host Configuration Protocol (DHCP) data and device properties, which help in determining the TFTP file to be generated. A dynamic configuration file provides more flexibility and security during the provisioning process and is best suited for networks with many service offerings or customer premises equipment (CPE) that requires unique configurations.

With Cisco Prime Cable Provisioning, a single centralized platform provides simplified management, automation, and high-speed processing - all of which combine to increase operator efficiency, reduce manual errors, and lower operating expenses.

Key Features and Benefits

Cisco Prime Cable Provisioning provides the following features and benefits:

- **Multistandard support:** Cisco Prime Cable Provisioning supports high-speed data provisioning of DOCSIS cable modems, residential gateways and set-top boxes, and PacketCable voice provisioning of MTAs. The solution also supports the OpenCable standard for digital cable set-top boxes and the newer DPoE standard for provisioning of EPON devices. Business customers need a fast and reliable connection, and cable service providers are responding by bringing fiber to the premises to meet their customers' demands. With DPoE, cable service providers can provision EPON devices without having to install new provisioning infrastructure. They can now use their existing DOCSIS infrastructure to provision EPON devices.
- **Reliability:** Cisco Prime Cable Provisioning provides high reliability and high availability to meet business-critical needs and help ensure minimum subscriber disruption. The solution offers multiple levels of redundancy through its distributed architecture of highly available regional distributed units (RDUs), multiple distributed device provisioning engines (DPEs) (each of which includes its own data-caching repository), a TFTP server, and a time-of-day (ToD) server. In addition, the solution includes support for avalanche protection to limit downtime after network outages.

- **Scalability and high performance:** Cisco Prime Cable provisioning is the industry's most scalable cable device provisioning system, supporting 50 million-plus devices in a single customer distributed deployment. The solution uses multiple distributed device management and caching engines to balance processing of device requests and help ensure high performance. A single provisioning group can support as many as 2 million devices, and multiple DPEs can be combined into groups to provide redundancy, load sharing, and disaster recovery.

  Cisco Prime Cable Provisioning's high-speed performance **supports rapid network expansion**; a single RDU server in conjunction with the appropriate number of DPE groups can support a sustained rate of hundreds of thousands of new devices a day. This allows for a simple way to extend provisioning to additional subscribers and new markets, dramatically simplifies capacity upgrades, and lowers maintenance costs.
- **Easy integration into existing service provider systems:** A flexible northbound interface promotes easy and secure integrations with existing service provider systems, such as billing, operations support systems (OSSs), workflow, mediation, and other customer management systems, through a Java provisioning or Web Services API. This, in turn, reduces operational costs and time to market for new services and helps accelerate revenue.

Table 2 outlines the detailed features and benefits of Cisco Prime Cable Provisioning.

Table 1. Cisco Prime Cable Provisioning Features and Benefits

Feature	Benefit
Standards Support	
CableLabs DOCSIS 3.0 support	Cisco Prime Cable Provisioning offers DOCSIS 1.0, 2.0, and 3.0 support. DOCSIS 3.0 provides IPv6 support and channel bonding, which allows increased data speeds for subscribers.
PacketCable 2.0 support	Support for PacketCable 1.0, 1.1, 1.5, and 2.0 (IPv4 only) allows for complete end-to-end IP voice service provisioning and meets all PacketCable security specifications.
OpenCable support	Support for OpenCable allows for provisioning of any set-top box compliant with CableLabs OpenCable standard.
New standards support - DPoE	With a single platform for DOCSIS provisioning, cable service providers can support EPON deployments and serve new business market segments.
DOCSIS Layer 2 VPN support	Support for CableLabs business services over the DOCSIS standard helps cable service providers expand their market reach to small and medium customers.
IPv6 support	Cisco Prime Cable Provisioning helps ease the transition to IPv6 with support for: • IPv4 and IPv6 cable modems • IPv4 MTAs behind an IPv4 or IPv6 cable modem • IPv4 or IPv6 devices (a router or PC, for example) behind an IPv4 or IPv6 cable modem • IPv4/IPv6 mixed environments
High Availability, Redundancy, and Disaster Recovery	
Distributed architecture	Cisco Prime Cable Provisioning offers true scalability and high reliability to manage a growing subscriber base while helping to ensure minimum subscriber service disruption. Distributed provisioning engines may be located in different data centers for disaster recovery support. This architecture allows a simple way to extend provisioning to additional subscribers and new markets, dramatically simplifies capacity upgrades, and helps lower maintenance costs.
Safe failover and load balancing	DPE high availability, RDU failover (for Red Hat Enterprise Linux [RHEL] and CentOS only), and DHCP failover promote high uptime and service reliability.

Feature	Benefit
Integration with External Systems	
Web Services API and Java based provisioning API	Ease of integration to cable service provider OSSs/BSSs helps automate the workflow process, improve accuracy, and accelerate time to market and time to revenue of new services.
RADIUS Integration	Support for RADIUS integration for the RDU API and DPE command-line interface (CLI) authentication helps externalize user and group management. Administrators no longer need to create users and groups within the Cisco Prime Cable Provisioning solution and can use central user management databases for authentication.
Extensibility	
Technology extensions	Powerful extension support allows this single platform to provision new devices and technologies to meet changing network and subscriber requirements.
Operational Control	
Scripting interface	Support for the Groovy scripting language helps automate and improve the flexibility of dynamic configuration file generation.
Templates	Templates for dynamic DOCSIS file generation offer an easy means to build unique DOCSIS files for individual subscriber devices. This reduces the number of configuration files and decreases operational costs.
Security	
Integrated Kerberos Protocol server (KDC) for PacketCable voice service provisioning	With a single platform, Cisco Prime Cable Provisioning includes all the necessary security components for PacketCable provisioning.
Fine-grained role-based access control (RBAC)	As the cable service provider organization evolves, more people with the organization need easy access to subscriber and device data that is present in the Cisco 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 while meeting the need for greater access. The new RBAC model allows administrators to create custom roles (user groups) and assign operational privileges to these 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, user interface and DPE CLI.
DOCSIS 3.0 EMIC support	Support for the CableLabs DOCSIS 3.0 Extended CMTS MIC (EMIC) standard allows operators to create a hash of configuration files such that users cannot change the configuration files themselves - for greater security.
SSL for RDU API and provisioning group communication	SSL support for RDU API helps ensure that sensitive information remains encrypted and secure between the Cisco Prime Cable Provisioning solution and the applications with which it integrates. In addition, administrators can enable SSL encryption among the RDU, the DPE and Cisco Prime Network Registrar DHCP extensions.

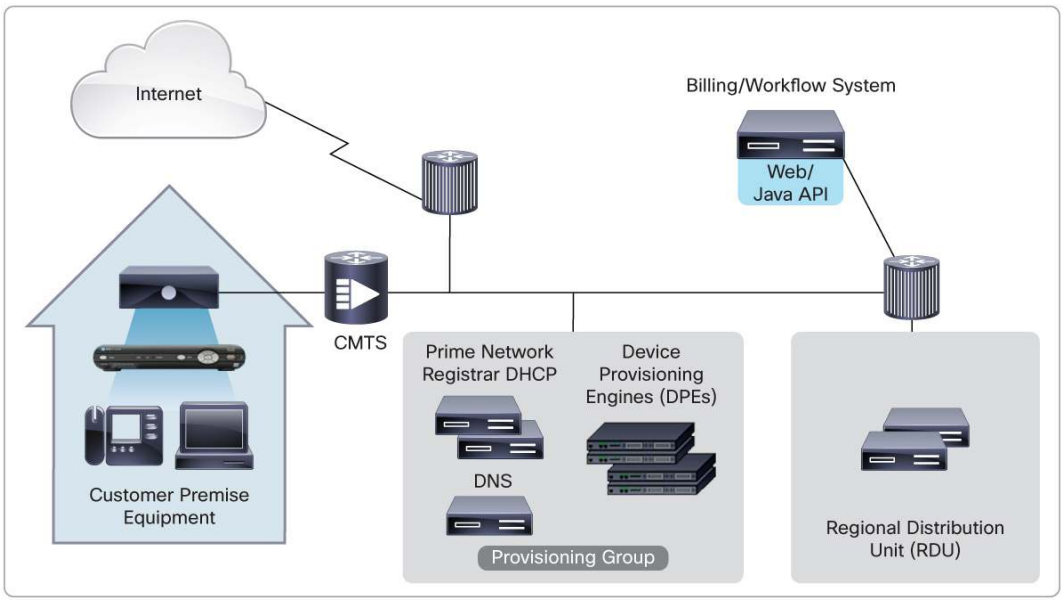
Product Specifications

Cisco Prime Cable Provisioning uses a distributed architecture for provisioning services on broadband devices. Figure 1 illustrates the components of the Cisco Prime Cable Provisioning solution, which include the following:

- Provisioning API: A flow-through provisioning interface used to integrate the Cisco Prime Cable Provisioning system with service providers' client programs, such as workflow applications and billing systems. Integration is implemented through a Java client library that service providers' client programs use to drive tiered-service selection and to trigger device activation on their networks. The client library reduces the need to develop integration code and facilitates integration with web-based user interfaces.
- RDU: The primary server in the Cisco 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

- DPE: The Cisco® DPE server that manages device configurations and that also contains the TFTP and ToD servers. The Cisco DPE manages:
  - Last step, device configuration, file handling
  - Communication of the configuration files through an embedded TFTP server
  - Embedded ToD server
  - Integration with Cisco Prime Network Registrar
  - Cached-device configuration and provisioning information
- Cisco Prime Network Registrar provides integrated, scalable, reliable Domain Name System (DNS), DHCP, and IP Address Management (IPAM) services for both IPv4 and IPv6. These protocol servers provide IP addresses, configuration parameters, and DNS names to devices, based on network and service policies. Cisco Prime Cable Provisioning relies upon the Cisco Prime Network Registrar servers for IP address assignment, DNS, device detection, and load distribution among Cisco Prime Cable Provisioning DPE servers.

Figure 1. Cisco Prime Cable Provisioning Architecture



Platform Support and System Requirements

Cisco Prime Cable Provisioning runs on Red Hat Linux, CentOS, and Cisco Unified Computing System™ servers. The solution also supports Oracle Solaris on the SPARC platform.

Table 2. Server System Requirements for Cisco Prime Cable Provisioning 5.0 DPE and RDU Servers

Number of Devices	Server	Number of CPUs	Memory (RAM)	Disk
100,000	DPE	2	2 GB	20 GB
	RDU	2	8 GB	40 GB
250,000	DPE	2	2 GB	20 GB
	RDU	2	8 GB	40 GB

Number of Devices	Server	Number of CPUs	Memory (RAM)	Disk
500,000	DPE	2	4 GB	20 GB
	RDU	2	8 GB	40 GB
1 million	DPE	4	8 GB	40 GB
	RDU	4	16 GB	80 GB
2 million	DPE	4	8 GB	40 GB
	RDU	4	16 GB	80 GB
Greater than 2 million	RDU	8	32 GB	200 GB

Please look at Cisco Prime Network Registrar for server requirements of that product. Please reach out to your Cisco contact for server guidelines for the KDC server for secure PacketCable deployments.

About Cisco Prime

The Cisco Prime portfolio of IT and service provider management offerings empowers organizations to more effectively manage their networks and the services they deliver. Built on a service-centered foundation, Cisco Prime supports integrated lifecycle management through an intuitive workflow-oriented user experience - providing A-to-Z management for IP next-generation networks, mobility, video, and managed services.

Service and Support

Using the Cisco lifecycle services approach, Cisco and its partners provide a broad portfolio of end-to-end services and support that can help increase your network's business value and return on investment. This approach defines the minimum set of activities needed, by technology and by network complexity, to help you successfully deploy and operate Cisco technologies and optimize their performance throughout the lifecycle of your network.

For More Information

For more information about Cisco Prime Cable Provisioning, visit http://cisco.com/go/primecable-provisioning, contact your local account representative, or send an email to ask-cableprovisioning@cisco.com.

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Printed in USA C78-727092-01 08/13