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IPCablecom SMA Part 3: Provisioning Specification

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1 SCOPE

1.1 Introduction and Purpose

This specification describes the provisioning and management of IPCablecom Security, Monitoring, and Automation (SMA) Gateways. The purpose is to specify the device, network and protocol requirements to configure and manage SMA gateways, along with the associated data element definitions. Provisioning and managing the SMA devices (e.g., controls and sensors) are out of scope of this document.

1.2 Document Overview

The document is structured as follows:

- Section 2 - References
- Section 3 - Terms and Definitions
- Section 4 - Abbreviations and Acronyms
- Section 5 - Overview
- Section 6 - IPCablecom SMA Provisioning Requirements
- Annex A - IPCablecom SMA Provisioning Data Models
- Annex B - DHCP- and SNMP-based Provisioning Data Models
- Annex C - Web Services based Provisioning Data Models

1.3 Requirements

Throughout this document, the words that are used to define the significance of particular requirements are capitalized. These words are:

"MUST"	This word means that the item is an absolute requirement of this specification.
"MUST NOT"	This phrase means that the item is an absolute prohibition of this specification.
"SHOULD"	This word means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications should be understood and the case carefully weighed before choosing a different course.
"SHOULD NOT"	This phrase means that there may exist valid reasons in particular circumstances when the listed behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
"MAY"	This word means that this item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because it enhances the product, for example; another vendor may omit the same item.

2 REFERENCES

The following documents contain provisions, which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

2.1 Normative References

- | | |
|----------------|---|
| [RFC 2863] | IETF RFC 2863, The Interfaces Group MIB, June 2000. |
| [RFC 3414] | IETF RFC 3414 / STD 0062, User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3), December 2002 |
| [RFC 3415] | IETF RFC 3415 / STD 0062, View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP), December 2002 |
| [RFC 3418] | IETF RFC 3418, Management Information Base (MIB) for the Simple Network Management Protocol (SNMP), December 2002. |
| [RFC 4113] | IETF RFC 4113, Management Information Base for the User Datagram Protocol (UDP), June 2005. |
| [RFC 4293] | IETF RFC 4293, Management Information Base for the Internet Protocol (IP), April 2006. |
| [RFC 4346] | IETF RFC 4346, The Transport Layer Security (TLS) Protocol Version 1.1, April 2006. |
| [RFC 4682] | IETF RFC 4682, Multimedia Terminal Adapter (MTA) Management Information Base for PacketCable- and IP-Cablecom-Compliant Devices, December 2006. |
| [OSSiv3.0] | ANSI/SCTE 135-4 2008 DOCSIS 3.0 Part 4: Operations Support Systems Interface |
| [PROV-1.5] | ANSI/SCTE 165-5 2009, IP-Cablecom 1.5 Part 5: Media Terminal Adapter (MTA) Device Provisioning. |
| [PKT-EUE-PROV] | PacketCable 2.0 E-UE Provisioning Specification, PKT-SP-EUE-PROV-I02-080710, July 10, 2008, Cable Television Laboratories, Inc. |
| [PKT-EUE-DATA] | PacketCable 2.0 E-UE Data Specification, PKT-SP-EUE-DATA-I02-080710, July 10, 2008, Cable Television Laboratories, Inc. |
| [PKT-UE-DATA] | PacketCable 2.0 UE Data Specification, PKT-SP-UE-DATA-I01-080905, September 5, 2008, Cable Television Laboratories, Inc. |
| [PKT-UE-PROV] | PacketCable 2.0 UE Provisioning Specification, PKT-SP-UE-PROV-I01-080905, September 5, 2008, Cable Television Laboratories, Inc. |

2.2 Informative References

This specification uses the following informative references.

- | | |
|----------|--|
| [TR-SMA] | ANSI/SCTE 169-1 2010, SMA Part 1: Architecture Framework Technical Report. |
| [SP-SMA] | ANSI/SCTE 169-2 2010, SMA Part 2: Security, Monitoring, and Automation Specification.. |

2.3 Reference Acquisition

- Cable Television Laboratories, Inc., 858 Coal Creek Circle, Louisville, CO 80027; Phone +1-303-661-9100; Fax +1-303-661-9199; <http://www.cablelabs.com>

- Internet Engineering Task Force (IETF) Secretariat, 46000 Center Oak Plaza, Sterling, VA 20166, Phone +1-571-434-3500, Fax +1-571-434-3535, <http://www.ietf.org>

3 TERMS AND DEFINITIONS

This specification uses the following terms:

Configuration	Configuration is the process of defining and propagating data to network elements for providing services.
Data Model	An abstract model that describes representation of data in a system.
Provisioning	Provisioning refers to the processes involved in the initialization of user attributes and resources to provide services to a User. This involves protocols, methodologies, and interfaces to network elements such as: Order Entry and Workflow Systems that carry out business processes, Operational Support Elements that handle network resources, Application Servers that offer services, and User Equipment that offer services, among others.
RESTful web services	Use of REST design principles via HTTP as the protocol.

4 ABBREVIATIONS AND ACRONYMS

This specification uses the following abbreviations:

CM	Cable Modem
CPE	Customer Premise Equipment
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
DOCSIS®	Data-Over-Cable Service Interface Specifications
eMTA	Embedded Multimedia Terminal Adapter
eSAFE	Embedded Service/Application Entity
E-SG	SMA gateway embedded with a cable modem
eUE	Embedded User Equipment
HFC	Hybrid Fiber-Coax
HTTP	Hyper Text Transport Protocol
IP	Internet Protocol
MIB	Management Information Base
MSO	Multiple System Operator
NAT	Network Address Translation
REST	REpresentational State Transfer
SG	SMA gateway
SMA	Security, Monitoring, Automation
SNMP	Simple Network Management Protocol
TLS	Transport Layer Security
UML	Unified Modeling Language
XML	eXtensible Markup Language

5 OVERVIEW

IPCablecom SMA is designed to address the areas of Security, Monitoring, and Automation. IPCablecom SMA considers four domains: the home domain, the access domain, the operator domain, and the central station domain. For more information about the SMA architecture, please refer to [TR-SMA]. The scope of IPCablecom SMA is the interface between the SMA gateway within the Home Domain, and the network elements (e.g., event server) within the Operator Domain. The signaling, media, and QoS requirements are addressed by [SP-SMA]. The network elements and the associated requirements to provision and manage an SMA gateway are specified in this document.

5.1 SMA gateways and Deployment Scenarios

The SMA gateway is a Customer Premise Equipment (CPE) device that works in conjunction with network elements in the Operator Domain. There are two types of SMA gateways: those that are embedded with a DOCSIS Cable Modem (E-SG), and those that are standalone. An E-SG always connects via a DOCSIS access network. A standalone SMA gateway may be deployed in two ways: directly connected via a cable modem, or via a home router (acting as a NAT device).

The type of SMA gateway (i.e., embedded or standalone) and deployment (i.e., is it behind a home router or not) affects the provisioning and management mechanisms. For example, SMA gateways that are connected behind home routers may not be able to rely on the Operator's DHCP server for provisioning related information. This document accommodates different SMA gateways and deployment models.

5.2 IPCablecom SMA Provisioning Mechanisms

To accommodate the different SMA gateway types, and the deployment scenarios, IPCablecom SMA presents two different provisioning mechanisms.

One type of provisioning mechanism uses the PacketCable 2.0 E-UE Provisioning Framework as specified in [PKT-EUE-PROV]. The PacketCable 2.0 E-UE Provisioning Framework uses Dynamic Host Configuration Protocol (DHCP) and Simple Network Management Protocol (SNMP) to provision the SMA gateway using basic, hybrid, or secure provisioning flows. SNMP is also used for management.

The other type of provisioning mechanism uses RESTful web services for provisioning. This mechanism is useful for devices that cannot be provisioned using DHCP and SNMP, i.e., those that are behind home routers. This approach reuses the RESTful web services based SMA Signaling interface for provisioning and management.

The choice of provisioning mechanism is dependent on the type of SMA gateway (e.g., whether is it embedded with a DOCSIS Cable Modem or not) and the deployment choices (e.g., a standalone SMA gateway can still be connected directly via a Cable Modem).

5.3 IP Network Environments

IPCablecom SMA gateways can support IPv4, IPv6, or both. SMA gateways need to make an operational choice during provisioning to pick an IP version. The way this choice is made is dependent on the provisioning mechanism.

5.4 IPCablecom SMA Data Models

To configure Provisioning, Configuration, and Management of the SMA gateway requires the use of data models. This specification uses UML modeling to develop these data models. The data models are then manifested as

SMIPv2 MIBs (for DHCP- and SNMP-based provisioning) and XML Schemas (for RESTful web services based provisioning).

6 IPCABLECOM SMA PROVISIONING

As indicated in Section 5, this specification specifies two types of provisioning and management mechanisms: DHCP- and SNMP-based and RESTful web services approach. Section 6.1 discusses the DHCP- and SNMP-based provisioning mechanism. Section 6.2 discusses the RESTful web services based provisioning mechanism.

6.1 DHCP- and SNMP-based Provisioning

The interfaces required to support this mechanism are depicted in Figure 1.

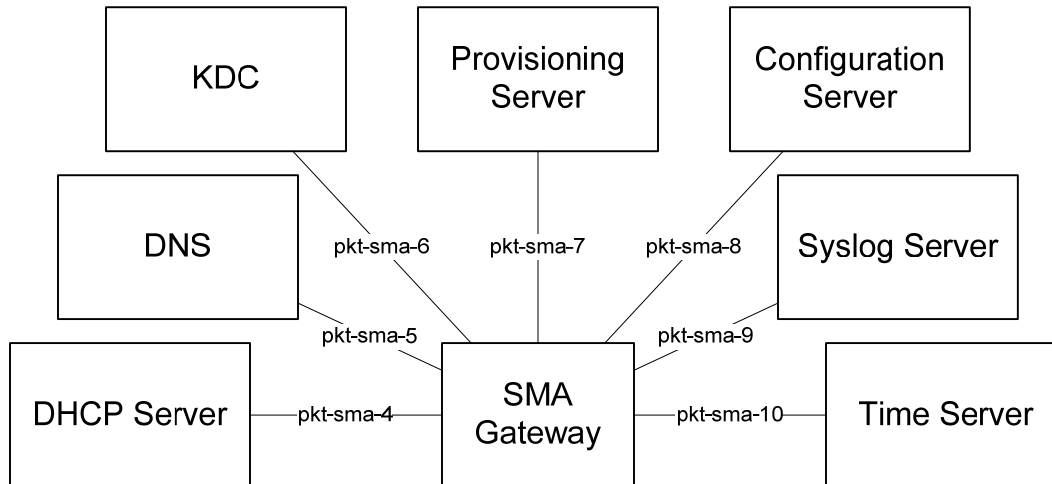


Figure 1 - DHCP- and SNMP-based Provisioning Interfaces

An SMA gateway using the DHCP- and SNMP-based provisioning mechanism **MUST** conform to the provisioning mechanism specified in [PKT-EUE-PROV], with the following clarifications:

- All references to UE and eUE are understood to apply to a conformant SMA gateway (embedded or otherwise), noting exceptions provided within this and dependent sections.
- eDOCSIS and eSAFE requirements are applicable only to the eCM and eSG components of an E-SG.
- All eCM data model requirements apply to an eCM within an E-SG.
- The eUE data model requirements specific to PacketCable 2.0 do not apply.
- When the SMA gateway is not embedded with a DOCSIS CM, the DHCPv4 and DHCPv6 server options for the SMA gateway cannot be retrieved via the CM and are considered to be equivalent to the corresponding wild card entries, 255.255.255.255 (for IPv4) and 0xFF 0xFF 0xFF 0xFF (IPv6), respectively.
- When the SMA gateway is not embedded with a DOCSIS CM, the eSG cannot obtain the time from the CM and has to contact the Time Server on its own; in the secure provisioning flow this needs to happen prior to Kerberos messages.