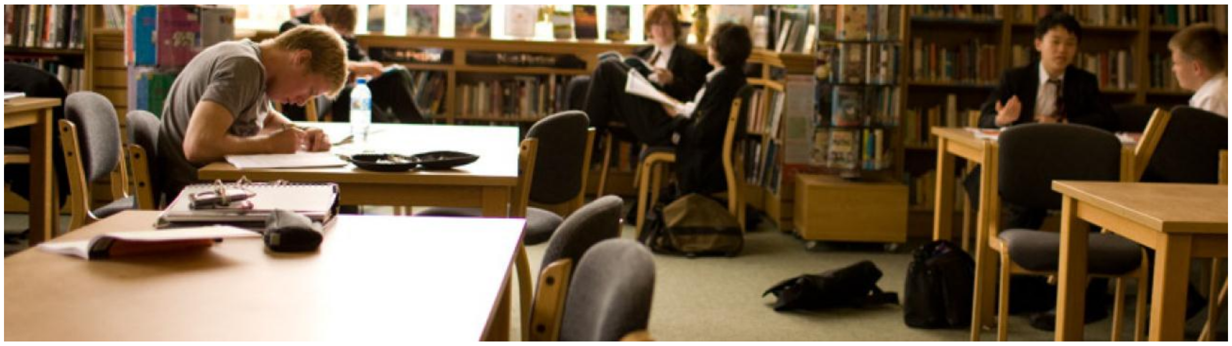
Cisco Prime Network Services Controller 3.0 XML API Guide



October 11, 2013

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Introducing the Cisco Prime Network Services Controller XML API

The following sections provide general information about Cisco Prime Network Services Controller (Prime Network Services Controller) and the XML application-programming interface (API):

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Overview of Prime Network Services Controller and the XML API

The following sections provide an overview of Prime Network Services Controller and the XML API:

- Prime Network Services Controller
- Prime Network Services Controller Management Information Model
- Prime Network Services Controller Components

Prime Network Services Controller

Prime Network Services Controller is a virtual appliance that provides centralized device and security policy management for Cisco virtual networking and services. It is designed to support enterprise and multiple-tenant cloud deployments. Prime Network Services Controller provides transparent, seamless, and scalable management for securing virtualized data center and cloud environments. Prime Network Services Controller 3.0 also provides hybrid-cloud management capabilities for Cisco InterCloud.

With a built-in GUI and an XML API, Prime Network Services Controller enables you to configure, deploy, and manage virtual services throughout the data center from a central location.

Prime Network Services Controller is built on an information model-driven architecture in which each managed device is represented by its subcomponents (or objects), which are parametrically defined. This approach provides a flexible and simple mechanism for securing a virtualized infrastructure with compute and edge firewalls.

Prime Network Services Controller supports multiple client organizations or tenants. Each tenant has their own virtualized compute, network, and storage resources that are deployed across a shared physical infrastructure. Multiple tenants can coexist on the same infrastructure, with each tenant maintaining administrative privileges for its virtualized resources. This multiple-tenancy design enables you to meet the specified service level agreement (SLA) for each tenant, including compute, network, storage, and security policies.

Prime Network Services Controller Management Information Model

All physical and logical components that comprise a Prime Network Services Controller service component are represented in a hierarchical management information model. This model is referred to as the management information tree. The hierarchical structure starts at the top and contains parent and child nodes. Each node in the tree represents a managed object (or group of objects) and displays the object’s administrative and operational states. Each object has a unique distinguished name (DN) that describes the object and its location in the tree.

Managed objects (policies, rules, security profiles, compute and edge firewalls) are abstractions of entities that Prime Network Services Controller manages. By invoking the API, objects are read from and written to the management information tree. The information model of an individual Prime Network Services Controller service component is centrally stored and managed by the data management engine (DME). When a user initiates an administrative change to a Prime Network Services Controller service component (for example, by associating an edge firewall profile to a Cisco Adaptive Security Appliance 1000V (ASA 1000V)), the DME first applies that change to the information model, and later the change is applied to the actual ASA 1000V. This approach is called a *model-driven framework*.

Prime Network Services Controller Components

Prime Network Services Controller consists of multiple service components that provide modularized functions for management, tenant management, policy management, resource management, and so on. These components are also called service providers or applications. Each component is accessed through a unique URL.

The following sections describe the Prime Network Services Controller components:

- Management Controller
- Service Registry
- Resource Manager
- Policy Manager
- VM Manager

Each component has its own data model and a DME that processes the model-driven service requests. Each component maintains its own management information tree storage (both in memory and in the persistent storage). Data sharing across different service components is achieved with ad-hoc interservice API communications or by using a publish or subscribe method.

Management Controller

Management Controller, also known as the core service, provides system-related services for the Prime Network Services Controller virtual machine. The following services are provided:

- Authenticates and authorizes user logins in local or LDAP mode.
- Provides access control, such as locales, roles, and trusted points.
- Maintains system information, such as the IP address, subnet mask, gateway, and hostname.
- Upon user input, performs system maintenance operations, such as database backup, data export, and data import.
- Maintains system diagnostic information, such as audit logs, faults, event logs, and core dump files.

The Management Controller type is mgmt-controller. Use this service type in the API URL for all requests related to the Management Controller.

Service Registry

Service Registry is the central service repository that holds information about all registered managed endpoints (such as ASA 1000v and Cisco Virtual Security Gateways (VSG)) and the service providers (such as Policy Manager or Resource Manager).

Note Service endpoints are referred to as clients in the GUI.

Service endpoints and the service providers register themselves dynamically with the Service Registry and retrieve information about service components from the Service Registry. The Service Registry is also responsible for tenant management and provides the following services:

- Upon user input, creates, deletes, and updates organizations (tenants, data centers, applications, and tiers). Organization changes are automatically propagated to Policy Manager and Resource Manager when policies and resources are attached to the intended organizations.
- Maintains information about the registered services (such as providers, endpoints, and Management Controller).
- Maintains diagnostic information, such as audit logs, faults, and event logs.

The Service Registry type is service-reg. Use this service type in the API URL for all requests related to the Service Registry. Resource Manager manages logical compute and edge firewalls and their association with VSGs and

Resource Manager

Resource Manager manages logical compute and edge firewalls and their association with VSGs and ASA 1000Vs, respectively. When an edge firewall is associated with an ASA 1000V, the device configuration profile information (defined by the edge firewall) is pushed to the ASA 1000V. This triggers the ASA 1000V to download the security profiles and policies from Policy Manager. Resource Manager is responsible for the following services:

- Maintains an inventory of ASA 1000Vs, VSGs, and Cisco Virtual Supervisor Modules (VSMs).
- With user input, defines compute firewalls and associates them with VSGs for provisioning.

- With user input, defines edge firewalls and associates them with ASA 1000Vs for provisioning.
- Interacts with VMware vCenter instances to retrieve Virtual Machine (VM) attributes.
- Maintains an inventory of discovered VMs and distributes them to the VSGs with the following information:
  - VM attributes, such as name, hypervisor, parent vApp, and cluster
  - vNIC attributes, such as port profile name and IP address
- Manages pools of VSGs and ASA 1000Vs.
- Maintains health states and faults for VSGs and ASA 1000Vs.
- Maintains diagnostic information, such as audit logs, faults, and event logs.

The Resource Manager type is resource-mgr. Use this service type in the API URL for all requests related to Resource Manager.

Policy Manager

Policy Manager is the central repository for device configuration profiles, service policies, service profiles, and all associated artifacts. When a compute firewall is associated with a VSG from Resource Manager, the VSG queries Policy Manager to resolve the device profile, service profiles, and all referenced policies. The VSG then configures itself according to the information retrieved from Policy Manager. The same process is used when an edge firewall is associated with an ASA 1000V.

Policy Manager provides the following services:

- Using the user input, defines:
  - Firewall device profiles
  - Object groups
  - Policies
  - Policy rules with conditions on:
    - Network attributes such as protocol, source or destination, IP address, and port.
    - VM attributes such as instance name, guest OS, zone, parent application, port profile, cluster, resource pool, hostname, and hypervisor.
    - Custom attributes.
    - Policy sets
    - Security profile dictionary and custom attributes
    - Service profiles
    - Prime Network Services Controller system management device profiles and policies for NTP, DNS, syslog, and faults.
    - Virtual zones (vZones)
- Using the user input, assigns policies and policy sets.
- Distributes service policies, service profiles, device profiles, and associated objects to edge and compute firewall instances.
- Maintains diagnostic information such as audit logs, faults, and event logs.

The Policy Manager service type is policy-mgr. Use this service type in the API URL for all requests related to Policy Manager.

VM Manager

M Manager is responsible for interacting with VMware vCenter and maintaining the VM information retrieved from vCenter. It is a backend service without any user-accessible services. The VM Manager service type is vm-mgr.

Prime Network Services Controller XML API

The Prime Network Services Controller XML API is a programmatic way of integrating and interacting with Prime Network Services Controller. The API interface accepts XML documents by using the HTTPS protocol. Developers can use any programming language to generate XML documents that contain the API methods. Configuration and state information is stored in a hierarchical tree structure known as the management information tree, and is completely exposed through the XML API.

The API model is recursively driven and provides major functionality for application development. For example, changes can be made on a single object, an object subtree, or the entire object tree. Changes can be made to a single attribute on an object or applied to the entire Prime Network Services Controller structure with a single API call.

The API operates in *forgiving* mode. Missing attributes are substituted with default values (if applicable) that are maintained in the DME. If multiple managed objects (such as policies) are being configured, and any of the managed objects cannot be configured, the API stops the operation, returns the configuration to its prior state, and then stops the API process with a fault notification.

The API leverages an asynchronous operations model to improve scalability and performance. Processes that require time to complete are *nonblocking* or *asynchronous*. This means that faster API processes are not blocked or delayed by those that require more time. A process receives a success message upon a valid request and a completion message when the task is finished.

Full event subscription is supported. Prime Network Services Controller sends notifications to all subscribers for the events that occur (such as changes to managed objects), and indicates the type of state change.

Future updates to the managed object data model will conform to the existing object model to ensure backward compatibility. If existing properties are changed during a product upgrade, it will be handled during the database load after the upgrade. New properties will be assigned default values.

Prime Network Services Controller uses a model-driven architecture, where changes are first applied to logical constructs in the form of managed objects. The managed objects then apply the changes to the endpoints to achieve the required state (that is, configuration) of the endpoint.

Operation of the API is transactional and terminates on a single data model. Prime Network Services Controller is responsible for all endpoint (ASA 1000V, VSG, and VSM) communication (such as state updates). API users cannot communicate directly with endpoints, which relieve the users from administering isolated, individual component configurations.

The Prime Network Services Controller API model includes the following programmatic entities:

- Classes—Objects and their properties and states in the management information tree.
- Methods—Actions that the API performs on one or more objects.
- Types—Collections or ranges of allowed values for object properties. A typical request comes into a service component's DME and is placed in the transactor queue in first-in, first-out (FIFO) order. The transactor gets the request from the queue, interprets the request, and performs an authorization check. When the request is confirmed, the transactor updates the management information tree. This process is done in a single transaction.

Prime Network Services Controller Data Model Schema

The data model HTML documents and schemas for all Prime Network Services Controller service providers are packaged with the Prime Network Services Controller server and can be accessed from either of the following URLs:

- https://Prime Network Services Controller-ip-address/doc, which includes:
  - core
  - policy-mgr
  - resource-mgr
  - service-reg
- https://Prime Network Services Controller-ip-address/schema, which includes:
  - core.in.xsd—Management controller configuration APIs and data model.
  - core.out.xsd—Management controller query APIs and data model.
  - policy-mgr.in.xsd—Policy manager configuration APIs and data model.
  - policy-mgr.out.xsd—Policy manager query APIs and data model.
  - resource-mgr.in.xsd—Resource manager configuration APIs and data model.
  - resource-mgr.out.xsd—Resource manager query APIs and data model.
  - service-reg.in.xsd—Service registry configuration APIs and data model.
  - service-reg.out.xsd—Service registry query APIs and data model.

Accessing Prime Network Services Controller Services

You can access Prime Network Services Controller services using XML API requests over HTTPS protocol. The HTTPS request URL format is:

```
https://Prime Network Services Controller-ip-address/xmlIM/service-type
```

where *service-type* is the type of the intended service provider as described in Prime Network Services Controller Components. For example, to submit a request to the Policy Manager, use the service type policy-mgr as shown in the following example:

```
https://Prime Network Services Controller-ip-address/xmlIM/policy-mgr
```

Object Naming

You can identify a specific object by its distinguished name (DN) or by its relative name (RN) as described in the following sections:

- Distinguished Name
- Relative Name

Distinguished Name

A DN enables you to unambiguously identify a target object. DNs use the following format, which consists of a series of relative names:

dn = rn/rn/rn/rn...

For example, a series of relative names might resemble the following example:

org-root/org-tenant1/zone-trustedServers-0

In the following example, the DN provides a fully qualified path for a Zone (vZone in the GUI) object (zone-trustedServers-0) from the top of the object tree to the object. The DN specifies the exact managed object on which the API call is operating.

< …dn = "org-root/org-tenant1/zone-trustedServers-0" />

Relative Name

An RN identifies an object within the context of its parent object. The DN of an object consists of the parent DN and the RN in the following format:

dn = parent-dn/rn

For example, a Zone (vZone in the GUI) object with the name trustedServers-0 that resides under the tenant Tenant1 has the following related RN and DNs:

- The object's RN is zone-trustedServers-0.
- The object's parent tenant DN is org-root/org-Tenant1.
- The object's DN is org-root/org-Tenant1/zone-trustedServers-0.

API Method Categories

Four method categories are used to interact with Prime Network Services Controller. Each API is a method, and each method corresponds to an XML document. The following sections describe method categories in more detail and how to use query filters to retrieve the required information:

- Authentication Methods
- Query Methods
- Query Filters
- Configuration Methods
- Cookie Handling

Note Several code examples in this guide substitute the term <real_cookie> for an actual cookie such as 1217377205/85f7ff49-e4ec-42fc-9437-da77a1a2c4bf. The Prime Network Services Controller cookie is a 47-character string. It is not the type of cookie that web browsers store locally to maintain session information.

Authentication Methods

Authentication methods initiate and maintain active Prime Network Services Controller sessions. A successful authentication must be performed before other API calls are allowed. API requests are cookie authenticated.

After a connection session is established and authenticated, a cookie is returned in the response. It is valid for 7200 seconds (120 minutes). The cookie must be refreshed during the session period to prevent it from expiring. Each refresh operation creates a cookie valid for the default interval.

A maximum of 256 sessions to Prime Network Services Controller can be opened at any one time. Subsequent login requests are rejected after the maximum session limit is reached.

Operations are performed by using the HTTP POST method. Prime Network Services Controller supports only the HTTPS protocol on port 443. The HTTP envelope contains the XML configuration.

Table 1 describes the available authentication methods.

Table 1. Available Authentication Methods

Method	Description
aaaLogin	Initial method for logging into Prime Network Services Controller. Establishes a connection session and obtains a valid cookie.
aaaRefresh	Maintains the session and refreshes the current authentication cookie.
aaaLogout	Terminates the current session and deactivates the current authentication cookie.

Query Methods

Query methods obtain information on the current configuration state of a Prime Network Services Controller object.

Most query methods have the argument inHierarchical, with a Boolean value of true/yes or false/no. If true, the inHierarchical argument returns all child objects. For example:

<configResolveDn … inHierarchical="false"></> <configResolveDn … inHierarchical="true"></>

API query methods can also include an inRecursive argument that specifies whether or not the call should be recursive; that is, whether the call should follow objects that point back to the referring objects or to the parent object.

Table 2 describes the available query methods.

Table 2. Query Methods

Filter	Description
configResolveDns	Retrieves objects by a set of DNs.
configResolveDns	Retrieves objects of multiple classes.
configResolveChildren	Retrieves the child objects of an object.
configResolveDns	Retrieves objects by a set of DNs.
configResolveDns	Retrieves objects of multiple classes.
configResolveChildren	Retrieves the child objects of an object.
configResolveParent	Retrieves the parent object of an object.
configScope	Performs class queries on a DN in the management information tree.

Query Filters

The API includes filters that increase the usefulness of the query methods. These filters can be passed as part of a query and are used to identify the wanted result set. The following sections describe the available filters:

- Simple Filters
- Property Filters
- Composite Filters
- Modifier Filters

Simple Filters

There are two simple filters: true and false. These filters react to the simple states of true or false, as follows:

- True filter—Result set objects carry the Boolean condition of true.
- False filter—Result set objects carry the Boolean condition of false.

For more information, see Simple Filters.

Property Filters

Property filters use object property values as the criteria for inclusion in a result set. To create most property filters; the classId and propertyId of the target object and property are required, along with a value for comparison.

Table 3 describes the types of property filters.

Table 3. Property Filters

Filter	Description
Equality	Result set contains objects with the identified property of equal to the provided property value.
Not equal	Result set contains objects with the identified property of not equal to the provided property value.
Greater	Result set contains objects with the identified property of greater than the provided property value.
Greater than or equal	Result set contains objects with the identified property of greater than or equal to the provided property value.
Less than	Result set contains objects with the identified property of less than the provided property value.
Less than or equal	Result set contains objects with the identified property of less than or equal to the provided property value.
Wildcard	Result set contains objects with the identified property that satisfies the wildcard criteria. Supported wildcards are: %—Percent sign, matching a single character. *—Asterisk, matching zero or more characters. ?—Question mark, matching zero or one character. •- —Dash, indicating a range to match. For example, [a-e] would match any character between a and e. +—Plus sign, matching one or more characters.
Any bits	Result set contains objects with the identified property that has at least one of the passed bits set. (Available for use only on bitmask properties.)
All bits	Result set contains objects with the identified property that has all the passed bits set. (Available for use only on bitmask properties.)

For more information, see Property Filters.

Composite Filters

Composite filters are composed of two or more component filters and thereby enable greater flexibility in creating result sets. For example, a composite filter could restrict the result set to only those objects that were accepted by at least one of the contained filters.

Table 4 describes the available composite filters.

Table 4. Composite Filters

Filter	Description
AND	Result set must pass the filtering criteria of each component filter. For example, to obtain all compute blades with a total memory greater than 64 megabytes and be operable, the filter is composed of one greater than filter and one equality filter.
Between	Result set contains those objects that fall between the range of the first specified value and second specified value. For example, all faults that
OR	Result set must pass the filtering criteria of at least one of the component filters. For example, to obtain all the service profiles that have an the filter is composed of two equality filters
XOR	Result set contains those objects that pass the filtering criteria of no more than one of the composite's component filters.

For more information, see Composite Filters.

Modifier Filters

Modifier filters change the results of a contained filter. Only the NOT modifier filter is supported. This filter negates the result of a contained filter. Use this filter to obtain objects that do not match contained criteria.

For more information, see Modifier Filters.

Configuration Methods

Several methods enable you to make configuration changes to managed objects. Depending on the configuration method you use, the changes can be applied to the whole tree, a subtree, or an individual object.

Examples of configuration methods include the following:

- configConfMo—Affects a single subtree, that is, a DN.
- configConfMos—Affects multiple subtrees, that is, several DNs.
- configConfMoGroup—Makes the same configuration changes to multiple subtree structures or managed objects.

Most configuration methods use the argument inHierarchical. These values do not play a significant role during configuration because child objects are included in the XML document and the DME operates in the forgiving mode.

Cookie Handling

It is recommended to keep the cookie value throughout the API session, adding it to any POST made later on. One can start with a "testCookie" at initial login.

The following configuration methods still apply :

- configConfMo—Affects a single subtree, that is, a DN.
- configConfMos—Affects multiple subtrees, that is, several DNs.

Cookie Request

```
<aaaLogin
        cookie="testCookie"
        inName="Admin-UserName"
        inPassword="Admin-Password"
</aaaLogin>
```

Cookie Response

The response from Prime Network Services Controller will include XML message with the following Xpath information:

```
<aaaLogin cookie="testCookie" commCookie="" srcExtSys="0.0.0.0"
destExtSys="0.0.0.0" srcSvc="" destSvc="" response="yes"
outCookie="<real_cookie>" outRefreshPeriod="600" outPriv="admin,read-only"
outDomains="" outChannel="fullssl" outEvtChannel="fullssl"
outSessionId="web_46649" outVersion="3.0(1c)" />
```

The response from Prime Network Services Controller will need to be filtered to get the session cookie value, this is held in the //aaaLogin/@outCookie value.

This information for example can be held in a variable called 'Cookie-Value' .

This value can then be used on all further session API calls.

For example a call to /service-reg can be made with the following cookie embedded:

```
<configConfMo cookie="Cookie-Value" inHierarchical="false">
    <inConfig>
<orgTenant dn="org-root/org-coke" status="created"/>
    </inConfig>
</configConfMo>
```

Data Validation

Prime Network Services Controller validates all configuration information that is entered via the API for each property, including the data type (such as integer, boolean, or string) and any additional constraints (such as an integer range or string regular expression). If the information supplied via the API does not meet the requirements for the specified property, Prime Network Services Controller stops the transaction and issues a failure response.

For more information about failure responses, see Success or Failure Responses.

Event Subscription Methods

When an object is created, changed, or deleted because of a user- or system-initiated action, an event is generated. Applications can receive Prime Network Services Controller state change information by regular polling or subscribing to events. Because polling is resource-expensive, event subscription is the preferred method of notification.

Event subscription allows a client application to register for event notification from Prime Network Services Controller. When an event occurs, Prime Network Services Controller sends a notification of the event and its type to the subscribing client applications. Only actual change events are sent, not the object's unaffected attributes. This process applies to all object changes in the system.

Subscribing to Event Notification

To subscribe to event notification:

Step 1. Log into Prime Network Services Controller to obtain a valid cookie for event subscription. If you are not logged in, the event subscription request will be rejected with an error response.

Step 2. Open an HTTP session and keep the session open.

Step 3. Post the eventSubcribe request through the HTTP session as follows:

```
<eventSubscribe cookie="<real_cookie>"></eventSubscribe>
```

After Prime Network Services Controller accepts the eventSubscribe request, Prime Network Services Controller sends all new events as they occur through the HTTP session.

Each event has a unique event identifier (ID). Event IDs operate as counters and are included in all event notifications. When an event is generated, the event ID counter increments and a new event is assigned a new event ID. This process enables tracking of events and ensures that no event is missed. If an event is missed by the client, you can use loggingSyncOcns to retrieve the missed event.

Note For Prime Network Services Controller, only the HTTP protocol is supported for event subscription. Use HTTP when posting the event subscription request.

The asynchronous event notifications for the following methods do not use the same format as other methods. Instead, event notifications for these methods use the format and syntax shown in the following examples.

configMoChangeEvent

```
<xs:element name="configMoChangeEvent" type="configMoChangeEvent"
substitutionGroup="externalMethod"/>
   <xs:complexType name="configMoChangeEvent" mixed="true">
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="errorCode" type="xs:unsignedInt"/>
      <xs:attribute name="errorDescr" type="xs:string"/>
      <xs:attribute name="invocationResult" type="xs:string"/>
   </xs:complexType>
```

methodVessel

```
<xs:element name="methodVessel" type="methodVessel"
substitutionGroup="externalMethod"/>
   <xs:complexType name="methodVessel" mixed="true">
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="errorCode" type="xs:unsignedInt"/>
      <xs:attribute name="errorDescr" type="xs:string"/>
      <xs:attribute name="invocationResult" type="xs:string"/>
   </xs:complexType>
```

UML Diagrams

Unified Modeling Language (UML) diagrams complement the object-oriented development approach used for Prime Network Services Controller. These diagrams display classes and the associations between them. It also displays attributes and methods, so that you can gain an overall view of Prime Network Services Controller classes and how they relate to one another.

The Prime Network Services Controller UML diagrams include the following attributes:

- Classes
- Associations
- Inheritance
- Aggregations and Compositions

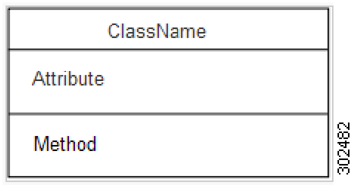
To view sample Prime Network Services Controller UML diagrams, see UML Diagrams.

Classes

In UML, a *class* is a representation of an object. In Prime Network Services Controller, examples of objects, and therefore classes, are tenants, compute firewalls, edge firewalls, policies, and profiles. In general, anything that you can create in Prime Network Services Controller can be considered a class.

Classes are the primary components of UML and are presented as rectangles in UML diagrams, as shown in Figure 1.

Figure 1 Representation of a Class in UML

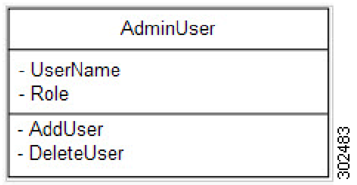


The class representation contains the following three sections:

- Class name—Name of the object.
- Attribute—Information that is stored about the object.
- Method—Operations that the object or class can perform.

Figure 2 shows an example of a class with example entries in each section.

Figure 2 Example Class in UML



Not all class diagrams contain content in all sections. For example, you might see UML class diagrams with class name and attributes, but without methods. In these situations, the three sections are displayed, but the method section contains no information.

Associations

An association in UML diagrams indicates that a link or dependency exists between two or more classes. Associations are represented in a number of ways, as shown in Figure 3 and described in Table 5.

Figure 3 Association in a UML Diagram

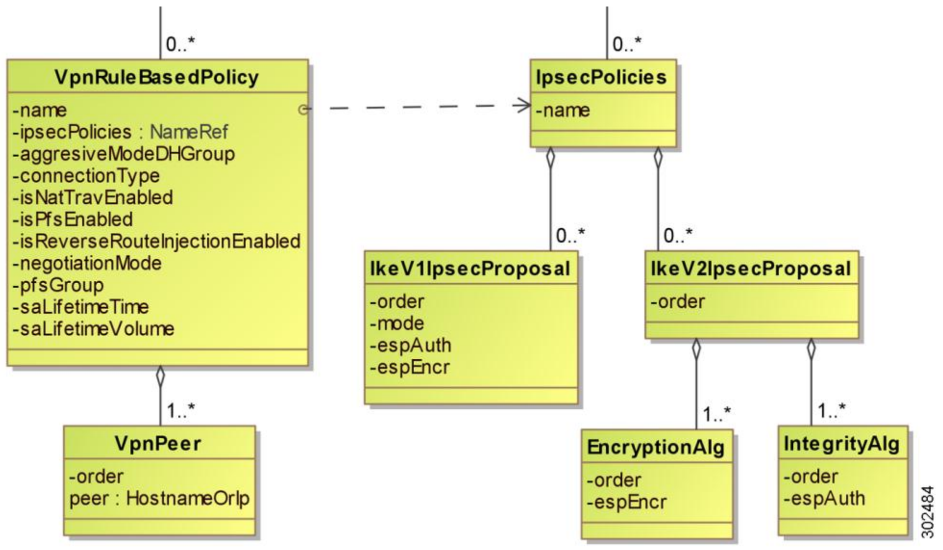


Table 5. UML Association Conventions

Convention	Description
Lines	
Solid line	• When used with a closed, unfilled arrowhead, indicates inheritance with the arrowhead pointing to the higher class object (or superclass). • When used with an open arrowhead, indicates an association to the known class.
Dashed line	Indicates a named reference, with the arrow originating from the referencing object.
Arrowheads	
Closed unfilled arrowhead	When used with a solid line, indicates inheritance, with the arrowhead pointing to the superclass.

Filled arrowhead	Indicates a nested flow of control or a procedure call.
Open arrowhead	When used with a solid line, indicates a unidirectional association with the arrowhead pointing to the known class.
Single arrowhead	• When used with a solid line, indicates inheritance with the arrowhead pointing to the superclass. • When used with a dashed line, indicates a unidirectional association, in the direction of the arrowhead.
Two or no arrowheads	When used with a solid line, indicates a bidirectional association.
Diamonds	
Empty diamond	Indicates a basic aggregation between objects with the empty diamond at the parent end.
Filled diamond	Indicates a composition aggregation between objects with the filled diamond at the parent end.
Multiplicity Indicators Indicate the number of instances of the object that can be associated with the connected object.	
0..1	Zero or one.
1	Only one.
0..*	Zero or more.
1..*	One or more.
n	Only n, where n > 1.
0..n	Only n, where n > 1.
1..n	Only n, where n > 1.

Inheritance

Similar or closely related classes often use many of the same attributes or methods. To prevent repetitive coding for multiple classes, UML employs an inheritance mechanism that enables you to reuse existing attributes and methods.

In an inheritance situation, the class that inherits the information is referred to as the subclass, and the class that is inherited from is referred to as the superclass. If all attributes and methods of one class are inherited by another class, that situation is referred to as pure inheritance.

In UML diagrams, inheritance is indicated by solid line with a closed arrowhead pointing from the subclass to the superclass.

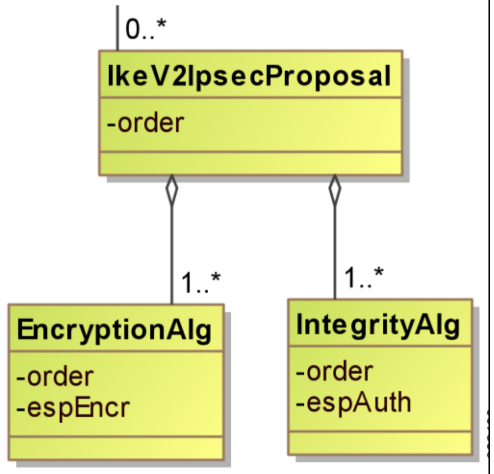
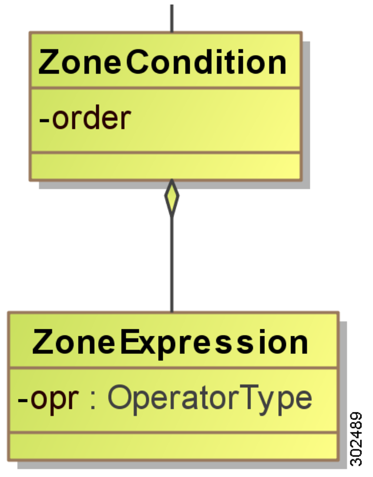
Aggregations and Compositions

Aggregations and compositions are types of associations that have unique characteristics. When working with UML diagrams, it is important to understand the differences between aggregations and compositions, and how they are presented in the diagrams.

Table 6 describes the differences between aggregation and composition associations.

Table 6. Aggregation and Composition Characteristics

In an Aggregation..	In a Composition..
The aggregate object does not affect the existence of the component object. That is, if the aggregate object is removed from the system, the component objects continue to exist.	The aggregate object affects the existence of the component object. That is, if the aggregate object is removed from the system, all component objects are also removed.
A component object can be aggregated by other classes in the system.	A component object cannot be used by any object other than its aggregate (or parent) object.
Changes in the component object can be propagated to the rest of the system.	Changes in the component object cannot be propagated to the rest of the system.

In UML diagrams, aggregations are represented by a solid line with an empty diamond at the parent end:	In UML diagrams, compositions are represented by a solid line with a filled diamond at the parent end:
 0..* IkeV2IpsecProposal -order 1..* 1..* EncryptionAlg -order -espEncr IntegrityAlg -order -espAuth	 ZoneCondition -order ZoneExpression -opr : OperatorType 302489

Capturing XML Interchange Between the Prime Network Services Controller GUI and Server

The Prime Network Services Controller GUI is a web-based application that is developed using an Adobe Flex GUI framework. As a result, you can capture the XML interchange between the GUI and the Prime Network Services Controller server by installing a debug version of Adobe Flash Player. After you install the debug version of Adobe Flash Player, the log output is stored in a log file under your home directory. (In Windows 7, the log file can be found under C:\Users\username\AppData\Roaming\Macromedia\Flash Player\Logs\flashlog.txt.)

Most of the sample request and response content included in the Example sections in Prime Network Services Controller XML API Methods is captured in this manner.

Success or Failure Responses

Prime Network Services Controller responds almost immediately to any API request. If the request cannot be completed, a failure is returned. For a query or login method, the actual results are returned. For configuration methods, a successful response indicates that the request is valid, but does not indicate that the operation was completed. For example, after a database backup request is accepted with a successful response from Prime Network Services Controller, the Prime Network Services Controller server might take a longer time to finish the actual backup.

The following sections describe response types in more detail:

- Successful Responses
- Failure Responses
- Empty Result Responses

Successful Responses

Upon a successful response, an XML document is returned with the requested information or a confirmation that changes were made.

The following example shows a configResolveDn request on a policy with the DN org-root/org-tenant d3337/pol-pl:

```
<configResolveDn cookie="<real_cookie>"
     dn="org-root/org-tenant_d3337/pol-p1"
     inHierarchical="false"/>
```

The response includes the following details:

```
<configResolveDn
    dn="org-root/org-tenant_d3337/pol-p1"
    cookie="<real_cookie>"
    commCookie="7/13/0/a3c"
    srcExtSys="10.193.34.70"
    destExtSys="10.193.34.70"
    srcSvc="sam_extXMLApi"
    destSvc="policy-mgr_dme"
    response="yes">
    <outConfig>
        <policyRuleBasedPolicy
            descr=""
            dn="org-root/org-tenant_d3337/pol-p1"
            intId="10811"
            name="p1"/>
    </outConfig>
</configResolveDn></configResolveDn>
```

Failure Responses

Responses to failed requests include XML attributes for errorCode and errorDescr. The following example shows the response to a failed request that tried to create a policy with the same name as another policy already in the system:

```
<configConfMo
    dn="org-root/org-tenant_d3337/pol-p1"
    cookie="<real_cookie>"
    commCookie="7/13/0/2038"
    srcExtSys="10.193.34.70"
    destExtSys="10.193.34.70"
    srcSvc="sam_extXMLApi"
    destSvc="policy-mgr_dme"
    response="yes"
    errorCode="103"
    invocationResult="unidentified-fail"
    errorDescr="can't create; object already exists.">
</configConfMo>
```

Empty Result Responses

A query request for a nonexistent object is not treated as a failure. If the object does not exist, a success message is returned, but the XML document contains an empty data field, <outConfig> </outConfig>, which indicates that the requested object was not found. The following example shows resolution by DN on a nonexistent policy:

```
<configResolveDn
    dn="org-root/org-tenant_d3337/pol-p1"
    cookie="<real_cookie>"
    commCookie="7/13/0/203e"
    srcExtSys="10.193.34.70"
    destExtSys="10.193.34.70"
    srcSvc="sam_extXMLApi"
    destSvc="policy-mgr_dme"
    response="yes">
    <outConfig>
    </outConfig>
</configResolveDn>
```

Common API Methods and Conventions

The following sections identify common Prime Network Services Controller API methods, describe API conventions, and provide example requests and responses:

- Methods and Filters
- API Examples

Methods and Filters

The following topics describe the methods and filters that Prime Network Services Controller uses:

- Authentication Methods
- Query Methods for Information Gathering
- Query Methods for Policies
- Query Methods for Faults
- Filters

Authentication Methods

Authentication allows API interaction with Prime Network Services Controller. It also provides a way to set permissions and control the operations that can be performed.

Note A session cookie is a 47-character string; it is not the type of cookie that web browsers store locally to maintain session information. Most code examples use <real_cookie> for an actual cookie such as 1217377205/85f7ff49-e4ec-42fc-9437-da77a1a2c4bf.

The following topics describe authentication methods in more detail:

- Login
- Refreshing the Session
- Logging Out of the Session
- Response to a Failed Login

Login

The following code sample shows a login request using HTTPS to connect to Prime Network Services Controller, and a Linux POST command to post authentication requests.

```
POST https://10.193.34.70/xmlIM/mgmt-controller
Please enter content (application/x-www-form-urlencoded) to be POSTed:
<aaaLogin
   inName="admin"
   inPassword="Company@123"/>
```

Note The XML version and DOCTYPES are not included in aaaLogin and should not be used. The inName and inPassword attributes are parameters.

Each XML API document represents an operation to be performed. When the request is received as an XML API document, Prime Network Services Controller reads the request and performs the actions as provided in the method. Prime Network Services Controller responds with a message in XML document format and indicates success or failure of the request.

The following code sample shows a typical successful response for a login request.

```
<aaaLogin
   response="yes"
   outCookie="<real_cookie>"
   outRefreshPeriod="600"
   outPriv="admin,read-only"
   outDomains="mgmt02-dummy"
   outChannel="fullssl"
```

```
    outEvtChannel="fullssl">
</aaaLogin>
```

Note The Prime Network Services Controller event channel uses HTTP, so it is neither encrypted nor transmitted over SSL.

Refreshing the Session

Sessions are refreshed with the aaaRefresh method, using the 47-character cookie obtained either from the aaaLogin response or a previous refresh.

The following code sample shows the method for refreshing a session.

```
<aaaRefresh
    inName="admin"
    inPassword="mypasword"
    inCookie="<real_cookie>"/>
```

Logging Out of the Session

The following code sample shows the method for logging out of a session.

```
<aaaLogout
    inCookie="<real_cookie>"/>
```

Response to a Failed Login

The following code sample shows the response to a failed login.

```
<aaaLogin
    response="yes"
    cookie=""
    errorCode="551"
    invocationResult="unidentified-fail"
    errorDescr="Authentication failed">
</aaaLogin>
```

Query Methods for Information Gathering

Query methods obtain information that includes hierarchy, state, and scope.

The following sections describe available query methods:

- configResolveDn
- configResolveDns
- configResolveClass
- configResolveClasses
- configFindDnsByClassId
- configResolveChildren
- configResolveParent
- configScope

configResolveDn

When using configResolveDn, note the following:

- The object specified by the DN is retrieved.
- The specified DN identifies the object instance to be resolved.
- The authentication cookie is received from aaaLogin or aaaRefresh. The inHierarchical attribute (default = false), if true, specifies that the results are hierarchical.
- The enumerated values, class IDs, and bit masks are displayed as strings.

See the example request/response in configResolveDn.

configResolveDns

When using configResolveDns to resolve multiple DNs, note the following:

- The objects specified by the DNs are retrieved.
- The specified DN identifies the object instance to be resolved.
- The authentication cookie is received from aaaLogin or aaaRefresh.
- The inHierarchical attribute (default = false), if true, specifies that the results are hierarchical.
- The enumerated values, class IDs, and bit masks are displayed as strings.
- The order of a request does not determine the order of the response.
- The unknown DNs are returned as part of the outUnresolved attribute.

See the example request/response in configResolveDns.

configResolveClass

When using configResolveClass to resolve a class, note the following:

- The objects of the specified class type are retrieved.
- The classId attribute specifies the object class name returned.
- The authentication cookie is received from aaaLogin or aaaRefresh.
- The inHierarchical attribute (default = false), if true, specifies that the results are hierarchical. The enumerated values, class IDs, and bit masks are displayed as strings.
- Result sets can be large. Be precise when defining result sets. For example, to get all instances of equipment, query the equipmentItem class. To obtain only a list of servers, use computeBlade as the attribute value for classId in the query.

See the example request/response in configResolveClass.

configResolveClasses

When using configResolveClasses to resolve multiple classes, note the following:

- The objects of the specified class type are retrieved.
- The classId attribute specifies the object class name returned.
- The authentication cookie is received from aaaLogin or aaaRefresh.
- The inHierarchical attribute (default = false), if true, specifies that the results are hierarchical.
- The enumerated values, class IDs, and bit masks are displayed as strings.

Note If an invalid class name is specified in the inIds attribute, an XML parsing error is generated. The query cannot execute.

See the example request/response in configResolveClasses.

configFindDnsByClassId

When finding distinguished names of a specified class, ensure the following:

- The DNs of the specified class are retrieved.
- The classId attribute specifies the object type to retrieve.
- The authentication cookie is received from aaaLogin or aaaRefresh.
- The inHierarchical attribute (default = false), if true, specifies that the results are hierarchical.
- The enumerated values, class IDs, and bit masks are displayed as strings.

See the example request/response in configFindDnsByClassId.

configResolveChildren

When resolving children of objects in the management information tree, ensure the following:

- The method obtains all child objects of a named object that are instances of the named class.

  Note If a class name is omitted, all child objects of the named object are returned.

- The inDn attribute specifies the named object from which the child objects are retrieved.
- The classId attribute specifies the name of the child object class to return.
- The authentication cookie is received from aaaLogin or aaaRefresh.
- The inHierarchical attribute (default = false), if true, specifies that the results are hierarchical.
- The enumerated values, class IDs, and bit masks are displayed as strings.

See the example request/response in configResolveChildren.

configResolveParent

When resolving the parent object of an object, ensure the following:

- The method retrieves the parent object of a specified DN.
- The dn attribute is the DN of the child object.
- The authentication cookie is received from aaaLogin or aaaRefresh.
- The inHierarchical attribute (default = false), if true, specifies that the results are hierarchical.
- The enumerated values, class IDs, and bit masks are displayed as strings.

See the example request/response in configResolveParent.

configScope

Limiting the scope of a query allows for a finer grained, less resource-intensive request. The query can be anchored at a point in the management information tree other than the root.

When setting the query scope, ensure the following:

- The method sets the root (scope) of the query to a specified DN and returns objects of the specified class type.
- The dn is the named object from which the query is scoped.
- The inClass attribute specifies the name of the object class to return.

  Note If a class name is not specified, the query acts the same as configResolveDn.

- The authentication cookie is received from aaaLogin or aaaRefresh.
- The inHierarchical attribute (default = false), if true, specifies that the results are hierarchical.
- The enumerated values, class IDs, and bit masks are displayed as strings.

See the example request/response in configScope.

Query Methods for Policies

Policies are available in different organizations. In a large system with many policies, querying all policies simultaneously is resource intensive. Instead, identify the type of policy and the parent organization to which the policies are attached.

The following code sample shows a query for rule-based policies:

```
<configScope
   cookie="<real_cookie>"
   inHierarchical="false"
   dn="org-root/org-tenant_d3338"
   inClass="policyRuleBasedPolicy" />
```

The response is as follows:

```
<configScope
   dn="org-root/org-tenant_d3338"
   cookie="<real_cookie>"
   commCookie="7/13/0/24e7"
   srcExtSys="10.193.34.70"
   destExtSys="10.193.34.70"
   srcSvc="sam_extXMLApi"
   destSvc="policy-mgr_dme"
```

```
    response="yes">
    <outConfigs>
        <policyRuleBasedPolicy
            descr=""
            dn="org-root/org-tenant_d3338/pol-p9"
            intId="10274"
            name="p9"/>
        <policyRuleBasedPolicy
            descr=""
            dn="org-root/org-tenant_d3338/pol-p1"
            intId="10301"
            name="p1"/>
    </outConfigs>
</configScope>
```

The following query using the DN is more efficient:

```
<configResolveDn
    inHierarchical="false"
    cookie="<real_cookie>"
    dn="sys org-root/org-tenant_d3338/pol-p1">
</configResolveDn>
```

To get the policy object and its rule data, change inHierarchical to true, as follows:

```
<configResolveDn
    inHierarchical="true"
    cookie="<real_cookie>"
    dn=" org-root/org-tenant_d3338/pol-p1">
</configResolveDn>
```

Query Methods for Faults

The following code sample shows a query for faults:

```
<configResolveClass
    cookie="<real_cookie>"
    inHierarchical="false"
    classId="faultInst"/>
```

The following example, which contains the filter <inFilter> eq class= “faultInst”, obtains a list of all major or critical faults:

```
<configResolveClass
    cookie="<real_cookie>"
    inHierarchical="false"
    classId="faultInst">
    <inFilter>
        <eq class="faultInst"
            property="highestSeverity"
            value="major" />
    </inFilter>
</configResolveClass>
```

Filters

Use filters to create specific and targeted queries, as described in the following topics:

- Simple Filters
- Property Filters
- Composite Filters
- Modifier Filters

Simple Filters

Simple filters use true and false conditions, as described in the following topics:

- False Conditions
- True Conditions

In addition to inHierarchical (shown in the following examples), inRecursive and inSingleLevel can also be set to true or false.

False Conditions

The following example shows a simple filter using a false condition:

```
<configResolveClass
    cookie="<real_cookie>"
    classId="topSystem"
    inHierarchical="false">
    <inFilter>
    </inFilter>
</configResolveClass>
```

True Conditions

The following example shows a simple filter using a true condition:

```
<configResolveClass
    cookie="<real_cookie>"
    classId="topSystem"
    inHierarchical="true">
    <inFilter>
    </inFilter>
</configResolveClass>
```

Property Filters

The following sections describe how to use property filters:

- Equality Filter
- Not Equal Filter
- Greater Than Filter
- Greater Than or Equal to Filter
- Less Than Filter
- Less Than or Equal to Filter
- Wildcard Filter
- Any Bits Filter
- All Bits Filter

Equality Filter

The following example shows an *equality* filter:

```
<configResolveClass
    cookie="<real_cookie>"
```

```
   inHierarchical="false"
   classId="fwComputeFirewall">
   <inFilter>
      <eq class="fwComputeFirewall"
         property="assocState"
         value="associated" />
   </inFilter>
</configResolveClass>
```

Not Equal Filter

The following example shows a *not equal* filter:

```
<configResolveClass
   cookie="<real_cookie>"
   inHierarchical="false"
   classId="fwComputeFirewall">
   <inFilter>
      <ne class="fwComputeFirewall"
         property="assocState"
         value="associated" />
   </inFilter>
</configResolveClass>
```

Greater Than Filter

The following example shows a *greater than* filter:

```
<configResolveClass
   cookie="<real_cookie>"
   classId="eventRecord"
   inHierarchical="false">
   <inFilter>
      <gt class="eventRecord"
         property="txId"
         value="36520" />
   </inFilter>
</configResolveClass>
```

Greater Than or Equal to Filter

The following example shows a *greater than or equal to* filter:

```
<configResolveClass
   cookie="<real_cookie>"
   inHierarchical="false"
   classId="sysdebugCore">
   <inFilter>
      <ge class="sysdebugCore"
         property="size"
         value="2097152" />
   </inFilter>
</configResolveClass>
```

Less Than Filter

The following example shows a *less than* filter:

```
<configResolveClass
   cookie="<real_cookie>"
   inHierarchical="false"
   classId="sysdebugCore">
```

```
    <inFilter>
        <lt class="sysdebugCore"
            property="size"\
            value="2097152" />
    </inFilter>
</configResolveClass>
```

Less Than or Equal to Filter

The following example shows a *less than or equal to* filter:

```
<configResolveClass
    cookie="<real_cookie>"
    inHierarchical="false"
    classId="sysdebugCore">
    <inFilter>
        <le class="sysdebugCore"
            property="size"
            value="2097152" />
    </inFilter>
</configResolveClass>
```

Wildcard Filter

The following example shows a *wildcard* filter that finds any virtual firewall whose name begins with the prefix “dmz”:

```
<configResolveClass
    cookie="<real_cookie>"
    inHierarchical="false"
    classId="fwInstance">
    <inFilter>
        <wcard class="fwInstance"
            property="name"
            value="dmz*" />
    </inFilter>
</configResolveClass>
```

Any Bits Filter

The following example shows an *any bits* filter:

```
<configResolveClass
    cookie="null"
    inHierarchical="false"
    classId="extpolClient">
    <inFilter>
        <anybit class="extpolClient"
            property="capability"
            value="vm-fw,vm-vasw" />
    </inFilter>
</configResolveClass>
```

All Bits Filter

The following example shows an *all bits* filter:

```
<configResolveClass
    cookie="<real_cookie>"
    inHierarchical="false"
    classId="extpolClient">
    <inFilter>
```

```
        <allbits class="extpolClient"
            property="capability"
            value="vm-fw,vm-vasw" />
    </inFilter>
</configResolveClass>
```

Composite Filters

The following topics describe composite filters:

- And Filter
- Or Filter
- Between Filter
- And Or Not Composite Filters

And Filter

The following example shows an *and* filter that finds firewalls that are associated with a configuration:

```
<configResolveClass
    cookie="<real_cookie>"
    inHierarchical="false"
    classId="fwComputeFirewall">
    <inFilter>
        <and>
            <eq class="fwComputeFirewall"
                property="assocState"
                value="associated" />
            <eq class="fwComputeFirewall"
                property="configState"
                value="applied" />
        </and>
    </inFilter>
</configResolveClass>
```

Or Filter

The following example shows an *or* filter that returns all managed endpoints whose operational state is either lost-visibility or unregistered.

```
<configResolveClass
    inHierarchical="false"
    cookie="<real_cookie>"
    classId="extpolClient">
    <inFilter>
        <or>
            <eq class="extpolClient"
                property="operState"
                value="unregistered"/>
                <eq class="extpolClient"
                property="operState"
                value="lost-visibility"/>
        </or>
    </inFilter>
</configResolveClass>
```

Between Filter

The following example shows a *between* filter:

```
<configResolveClass
```

```
   cookie="<real_cookie>"
   classId="eventRecord"
   inHierarchical="false">
   <inFilter>
      <bw class="eventRecord"
         property="txId"
         firstValue="4"
         secondValue="5"/>
   </inFilter>
</configResolveClass>
```

And Or Not Composite Filters

The following example shows an *and or not* composite filter that returns all objects of type fwComputeFirewall that have an associated state of unassociated or a config state of not-applied, but that do not have an auxiliary property value of reachability:

```
<configScope
   cookie="<real_cookie>"
   dn="org-root"
   inClass="fwComputeFirewall"
   inHierarchical="false"
   inRecursive="false">
   <inFilter>
      <and>
         <or>
            <eq class="fwComputeFirewall" property="assocState"
            value="unassociated" />
            <eq class="fwComputeFirewall" property="configState" value="not-
            applied" />
         </or>
         <not>
            <eq class="fwComputeFirewall" property="auxProps"
            value="reachability"/>
         </not>
      </and>
   </inFilter>
</configScope>
```

Modifier Filter

Not Filter

The following example shows a not modifier filter:

```
<configResolveClass
   cookie="<real_cookie>"
   inHierarchical="false"
   classId="extpolClient">
   <inFilter>
      <not>
         <anybit class="extpolClient"
            property="capability"
            value="vm-fw" />
      </not>
   </inFilter>
</configResolveClass>
```

API Examples

The following sections provide API configuration and management examples:

- Authentication Using the Management Controller
- Tenant Management Using the Service Registry
- Resource Management
- Policy_Management

The following sections demonstrate how configConfMos is used to create, modify, or delete an MO (or object). In each example where the configConfMos API uses a single XML element <pair> to specify a single configuration object, you can use the configConfMo API to obtain the same result.

Authentication Using the Management Controller

Access to Prime Network Services Controller is session-based and must first be authenticated with a login request. Default session lengths are 120 minutes. Sessions can be extended with the aaaKeepAlive and aaaRefresh methods. We recommend, when activity is completed, that the user manually log out of the session using aaaLogout.

Use service type mgmt-controller to send login requests to Prime Network Services Controller.

The following topics provide examples of authentication requests and responses:

- Authentication Request
- Authentication Response

Authentication Request

The following example shows an authentication request:

```
POST URL: https://10.193.33.221/xmlIM/mgmt-controller
XML API payload:
<aaaLogin
    inName="admin"
    inPassword="Nbv12345"/>
```

Authentication Response

The following example shows an authentication response:

```
<aaaLogin
    cookie=""
    commCookie=""
    srcExtSys="0.0.0.0"
    destExtSys="0.0.0.0"
    srcSvc="" destSvc=""
    response="yes"
    outCookie="<real_cookie>"
    outRefreshPeriod="600"
    outPriv="admin,read-only"
    outDomains=""
    outChannel="fullssl"
    outEvtChannel="fullssl"
    outSessionId="web_13528"
    outVersion="1.0">
</aaaLogin>
```

Tenant Management Using the Service Registry

The Service Registry, service type service-reg, creates and manages tenants and the suborganizations that are used to organize policies and resources. These tenants and suborganizations are arranged in a tree hierarchy for the bottom-up policy and resource resolution. Class names used in tenant and suborganization creation support the following four levels:

- Tenant, class orgTenant—Defines the top level organization.
- Data Center, class orgDatacenter—Defines a data center under a Tenant.
- Application, class orgApp—Defines an application under a Data Center.
- Tier, class orgTier—Defines a tier under an Application.

To create a new organization, or update an existing organization, provide the following information:

- Object DN
- Attribute values
- Status equal to created or modified
- To delete an organization, use a status = deleted in the request.

The following topics provide examples of create or update requests and responses:

- Create or Update Organization Request
- Create or Update Organization Response

Create or Update Organization Request

The following example shows how to create a tenant named demoTenant:

```
<configConfMos
   cookie="<real_cookie>">
   <inConfigs>
      <pair key="org-root/org-demoTenant">
         <orgTenant dn="org-root/org-demoTenant"
            name="demoTenant"
            status="created"/>
      </pair>
   </inConfigs>
</configConfMos>
```

Create or Update Organization Response

The following example shows the response that is received after creating a tenant named demoTenant:

```
<configConfMos
   cookie="<real_cookie>"
   commCookie="2/15/0/839"
   srcExtSys="10.193.33.221"
   destExtSys="10.193.33.221"
   srcSvc="sam_extXMLApi"
   destSvc="service-reg_dme"
   response="yes">
   <outConfigs>
      <pair key="org-root/org-demoTenant">
         <orgTenant
            descr=""\
            dn="org-root/org-demoTenant"
            fltAggr="0"
            level="1"
            name="demoTenant"
            status="created"/>
      </pair>
   </outConfigs>
</configConfMos>
```

Resource Management

The Resource Management component performs the following functions:

- Creates an edge firewall.
- Assigns compute and edge firewalls to policies.
- Queries for available firewall instances.
- Associates firewall instances with a managed object.
- Allows the binding of organizations to resource pools.
- Interacts with virtual centers to retrieve VM attributes.

The following topics provide examples for working with firewalls:

- Create an Edge Firewall
- Create a Compute Firewall
- Assign a Device Profile to a Compute Firewall
- Query Firewall Instances

Create an Edge Firewall

The following example creates an edge firewall with one inside data interface and one outside data interface.

Request

```
<configConfMos
   cookie="<real_cookie">
   <inConfigs>
      <pair key="org-root/efw-default">
         <fwEdgeFirewall
            dn="org-root/efw-default"
            rn="efw-default"
            name="default"
            haMode="standalone"
            status="created"/>
      </pair>
      <pair key="org-root/efw-default/interface-inside">
         <fwDataInterface
            dn="org-root/efw-default/interface-inside"
            name="inside"
            role="inside"
            ipSubnet="255.255.255.0"
            ipAddressPrimary="10.10.10.1"
            status="created"/>
      </pair>
      <pair key="org-root/efw-default/interface-outside">
         <fwDataInterface
            dn="org-root/efw-default/interface-outside"
            name="outside"
            role="outside"
            ipSubnet="255.255.255.0"
            ipAddressPrimary="10.10.20.1"
            status="created"/>
      </pair>
   </inConfigs>
</configConfMos>
```

Response

```
<configConfMos
   cookie="<real_cookie>"
   commCookie="5/12/0/35da"
```

```
    srcExtSys="172.20.101.150"
    destExtSys="172.20.101.150"
    srcSvc="sam_extXMLApi"
    destSvc="resource-mgr_dme"
    response="yes">
    <outConfigs>
        <pair key="org-root/efw-default">
            <fwEdgeFirewall
                assocState="unassociated"
                auxProps=""
                configState="not-applied"
                descr=""
                dn="org-root/efw-default"
                fltAggr="0"
                haMode="standalone"
                hostname="edge-firewall"
                intId="10467"
                name="default"
                status="created"/>
        </pair>
        <pair key="org-root/efw-default/interface-inside">
            <fwDataInterface
                descr=""
                dn="org-root/efw-default/interface-inside"
                intId="10468"
                ipAddressPrimary="10.10.10.1"
                ipAddressSecondary="0.0.0.0"
                ipSubnet="255.255.255.0"
                isIpViaDHCP="no"
                name="inside"
                role="inside"
                status="created"/>
        </pair>
        <pair key="org-root/efw-default/interface-outside">
            <fwDataInterface
                descr=""
                dn="org-root/efw-default/interface-outside"
                intId="10469"
                ipAddressPrimary="10.10.20.1"
                ipAddressSecondary="0.0.0.0"
                ipSubnet="255.255.255.0"
                isIpViaDHCP="no"
                name="outside"
                role="outside"
                status="created"/>
        </pair>
    </outConfigs>
</configConfMos>
```

Create a Compute Firewall

The following example creates a compute firewall with the name test5.

Request

```
<configConfMos
    cookie="<real_cookie>"
    inHierarchical="false">
    <inConfigs>
        <pair key="org-root/cfw-test5">
            <fwComputeFirewall
            dn="org-root/cfw-test5"
            name="test5"
            dataIpAddress="5.5.5.5"
            dataIpSubnet="255.255.255.0"
            status="created"/>
      </pair>
   </inConfigs>
</configConfMos>
```

Response

```
<configConfMos
   cookie="<real_cookie>"
   commCookie="5/12/0/1545"
   srcExtSys="172.25.97.246"
   destExtSys="172.25.97.246"
   srcSvc="sam_extXMLApi"
   destSvc="resource-mgr_dme"
   response="yes">
   <outConfigs>
      <pair key="org-root/cfw-test5">
         <fwComputeFirewall
            assocState="unassociated"
            auxProps=""
            configState="not-applied"
            dataIpAddress="5.5.5.5"
            dataIpSubnet="255.255.255.0"
            descr=""
            devicePolicy=""
            dn="org-root/cfw-test5"
            fltAggr="0"
            hostname="firewall"
            intId="10583"
            name="test5"
            status="created"/>
      </pair>
   </outConfigs>
</configConfMos>
```

Assign a Device Profile to a Compute Firewall

Beginning with Virtual Network Management Center 2.0, fw:ComputeFirewall.devicePolicy is deprecated and should not be modified via the XML API. Instead, create a child MO of type logical:DeviceProfileAssociation, and set logical:DeviceProfileAssociation.profileRef. The logical:DeviceProfileAssociation should be a child of fw:ComputeFirewall.

If you modify fw:ComputeFirewall.devicePolicy, you might see inconsistent behavior between fw:ComputeFirewall.devicePolicy and logical:DeviceProfileAssociation, and thus what is displayed in the UI.

The following example assigns the device profile my-profile-ref to the compute firewall test5, which was created in Create a Compute Firewall.

Request

```
<configConfMos
   cookie="<real_cookie>"
   inHierarchical="false">
   <inConfigs>
      <pair key="org-root/cfw-test5/device-profile">
         <logicalDeviceProfileAssociation
            dn="org-root/cfw-test5/device-profile"
            profileRef="my-profile-ref"
            status="created"/>
      </pair>
```

```
    </inConfigs>
</configConfMos>
```

Response

```
<configConfMos
    cookie="<real_cookie>"
    commCookie="5/12/0/1571"
    srcExtSys="172.25.97.246"
    destExtSys="172.25.97.246"
    srcSvc="sam_extXMLApi"
    destSvc="resource-mgr_dme"
    response="yes">
    <outConfigs>
        <pair key="org-root/cfw-test5/device-profile">
            <logicalDeviceProfileAssociation
                descr=""
                dn="org-root/cfw-test5/device-profile"
                intId="10586"
                name=""
                profileRef="my-profile-ref"
                status="created"/>
        </pair>
    </outConfigs>
</configConfMos>
```

Query Firewall Instances

The following example queries all firewall instances with the management IP address of 10.193.33.221 and obtains their attributes.

Request

```
POST URL: https://10.193.33.221/xmlIM/resource-mgr
XML API payload:
<configResolveClass
    cookie="<real_cookie>"
    classId="fwInstance"
    inHierarchical="false">
    <inFilter>
        <eq class="fwInstance"
            property="mgmtIp"
            value="10.193.33.221" />
    </inFilter>
</configResolveClass>
```

Response

```
configResolveClass
    cookie=<real_cookie>"
    commCookie="5/15/0/1d9"
    srcExtSys="10.193.33.221"
    destExtSys="10.193.33.221"
    srcSvc="sam_extXMLApi"
    destSvc="resource-mgr_dme"
    response="yes"
    classId="fwInstance">
    <outConfigs>
        <fwInstance
            assignedToDn=""
            assoc="none"
            descr=""
            dn="fw/inst-1005"
            fltAggr="0"
            fsmDescr=""
            fsmPrev="DisassociateSuccess"
            fsmProgr="100"
            fsmRmtInvErrCode="none"
            fsmRmtInvErrDescr=""
            fsmRmtInvRslt=""
            fsmStageDescr=""
            fsmStamp="2010-12-03T23:18:13.304"
            fsmStatus="nop"
            fsmTry="0"
            intId="10155"
            mgmtIp="10.193.33.221"
            model=""
            name="firewall"
            pooled="0"
            registeredClientDn="extpol/reg/clients/client-1005"
            revision="0"
            serial=""
            svcId="1005"
            vendor=""/>
    </outConfigs>
```

Policy Management

The following topics describe how to manage policies:

- Device Policies
- Device Profiles
- Zone
- Object Group
- Attribute Dictionary
- Policy
- PolicySet
- Compute Security Profile

Device Policies

The following topics provide examples for working with device policies:

- Syslog Policy
- SNMP Policy
- LogProfile Policy

Syslog Policy

A syslog policy object tracks all actions that take place within the system and sets the logging level for a device profile. The following example creates a syslog policy named mysyslog.

Request

```
<configConfMos
    cookie="<real_cookie>">
    <inConfigs>
        <pair key="org-root/syslog-mysyslog">
            <commSyslog dn="org-root/syslog-mysyslog">
            <commSyslogConsole
                adminState="enabled"
                severity="emergencies"/>
            <commSyslogClient
                name="primary"
                adminState="enabled"
                hostname="5.6.7.8"
                severity="notifications"
                forwardingFacility="local7"/>
            <commSyslogClient
                name="secondary"
                adminState="enabled"
                hostname="123.23.53.123"
                severity="warnings"
                forwardingFacility="local5"/>
            </commSyslog>
        </pair>
    </inConfigs>
</configConfMos>
```

Response

```
<configConfMos
    cookie="<real_cookie>"
    commCookie="7/15/0/1b9"
    srcExtSys="10.193.33.221"
    destExtSys="10.193.33.221"
    srcSvc="sam_extXMLApi"
    destSvc="policy-mgr_dme"
    response="yes">
        <outConfigs>
            <pair key="org-root/syslog-mysyslog">
            <commSyslog
                adminState="enabled"
                descr=""
                dn="org-root/syslog-mysyslog"
                intId="25301"
                name="mysyslog"
                port="514"
                proto="udp"
                severity="warnings"
                status="created"/>
            </pair>
    </outConfigs>
</configConfMos>
```

SNMP Policy

The following example creates an SNMP policy named mysnmp. Once created, this policy is available by that name in the device profile listing.

Request

```
<configConfMos
    cookie="<real_cookie>">
    <inConfigs>
        <pair key="org-root/snmp-mysnmp">
        <commSnmp dn="org-root/snmp-mysnmp"
            adminState="enabled"
            descr="The default SNMP policy"
            sysContact="Andrew Jackson"
            sysLocation="San Jose" >
        <commSnmpCommunity
            community="public"
            role="read-only"/>
        <commSnmpTrap
            hostname="nms-23.host123.com"
            community="private"/>
        <commSnmpTrap
            hostname="nms-42.host123.com"
            community="private"/>
        </commSnmp>
        </pair>
    </inConfigs>
</configConfMos>
```

Response

```
<configConfMos
    cookie="<real_cookie>"
    commCookie="7/15/0/1bc"
    srcExtSys="10.193.33.221"
    destExtSys="10.193.33.221"
    srcSvc="sam_extXMLApi"
    destSvc="policy-mgr_dme"
    response="yes">
    <outConfigs>
        <pair key="org-root/snmp-mysnmp">
        <commSnmp
            adminState="enabled"
            descr="The default SNMP policy"
            dn="org-root/snmp-mysnmp"
            intId="25281"
            name="mysnmp"
            port="161"
            proto="all"
            sysContact="Andrew Jackson"
            sysLocation="San Jose"/>
        </pair>
    </outConfigs>
</configConfMos>
```

LogProfile Policy

The following example sets the debug level and logging level for a LogProfile policy named debugLog.

Request

```
POST URL: https://10.193.33.221/xmlIM/policy-mgr
XML API payload:
<configConfMos
    cookie="<real_cookie>">
    <inConfigs>
        <pair key="org-root/logprof-debugLog">
        <policyLogProfile
            dn="org-root/logprof-debugLog"
            name="debugLog"
            level="debug1"
            size="10000000"
            backupCount="4"/>
        </pair>
    </inConfigs>
</configConfMos>
```

Response

```
<configConfMos
    cookie="<real_cookie>"
    commCookie="7/12/0/17d0"
    srcExtSys="172.20.101.150"
    destExtSys="172.20.101.150"
    srcSvc="sam_extXMLApi"
    destSvc="policy-mgr_dme"
    response="yes">
    <outConfigs>
        <pair key="org-root/logprof-debugLog">
            <policyLogProfile
            adminState="enabled"
            backupCount="4"
            descr=""
            dn="org-root/logprof-debugLog"
            intId="10514"
            level="debug1"
            name="debugLog"
            size="10000000"
            status="created"/>
        </pair>
    </outConfigs>
</configConfMos>
```

Device Profiles

This action creates a device profile named myDeviceProfile. It enables the profile and designates the contents of the profile.

Request

```
POST URL: https://10.193.33.221/xmlIM/policy-mgr
XML API payload:
<configConfMos
    cookie="<real_cookie>">
    <inConfigs>
        <pair key="org-root/org-Cola/fwdevprofile-myDeviceProfile">
        <fwpolicyFirewallDeviceProfile
            dn="org-root/org-Cola/fwdevprofile-myDeviceProfile"
            snmpPolicy="mysnmp"
            syslogPolicy="mysyslog"
            timezone="America/Los_Angeles" >
        <commDns
            name="somedns.com"
            domain="somedns.com"/>
<!-- The order attribute means the device should first use the DNS provider with the
smallest "order" value. If that DNS server is not responsive, use the DNS provider
with the next smaller number. -->
        <commDnsProvider
            hostip="171.70.168.183"
            order="1"/>
        <commDnsProvider
            hostip="171.68.226.120"
            order="2"/>
        <commDnsProvider
            hostip="64.102.6.247"
            order="3"/>
        <commNtpProvider
            name="somentp.com"
            order="1"/>
        <commNtpProvider
            name="north-america.pool.ntp.org"
            order="2"/>
        </fwpolicyFirewallDeviceProfile>
        </pair>
    </inConfigs>
</configConfMos>
```

Response

```
<configConfMos
    cookie="<real_cookie>"
    commCookie="7/15/0/1ba"
    srcExtSys="10.193.33.221"
    destExtSys="10.193.33.221"
    srcSvc="sam_extXMLApi"
    destSvc="policy-mgr_dme"
    response="yes">
    <outConfigs>
        <pair key="org-root/org-Cola/fwdevprofile-myDeviceProfile">
        <fwpolicyFirewallDeviceProfile
            coreFilePolicy="
            descr=""
            dn="org-root/org-Cola/fwdevprofile-myDeviceProfile"
            dnsPolicy=""
            enablePolicyDecisionLog="no"
            faultPolicy=""
            httpPolicy=""
            httpsPolicy=""
            intId="25326"
            logProfilePolicy=""
            name="myDeviceProfile"
            snmpPolicy="mysnmp"
            status="created"
            syslogPolicy="mysyslog"
            telnetPolicy=""
            timezone="America/Los_Angeles"/>
        </pair>
    </outConfigs>
</configConfMos>
```

Zone

The following example creates two zones: trustedClients-0 and trustedServers-0. A set of attributes with values is also assigned.

Note In the Prime Network Services Controller UI, a zone is represented as a vZone (virtual Zone).

Request

```
POST URL: https://10.193.33.221/xmlIM/policy-mgr
XML API payload:
<configConfMos
    cookie="<real_cookie>">
    <inConfigs>
        <pair key="org-root/org-tenant1/zone-trustedClients-0">
<!-- Create a zone of all VMs in the 192.168.1.0/24 subnet -->
            <policyZone dn="org-root/org-tenant1/zone-trustedClients-0">
                <policyZoneCondition id="1" order="1">
                    <policyZoneExpression opr="prefix">
                        <policyIPAddress id="1" value="192.168.1.0"
                            <policyIPSubnet id="1" value="255.255.255.0" />
                    </policyZoneExpression>
                </policyZoneCondition>
            </policyZone>
        </pair>
```

```
      <pair key="org-root/org-tenant1/zone-trustedServers-0">
<!-- Create a zone of all VMs attached to a VNSP where the "appType" is set to
"BuildServer" -->
         <policyZone dn="org-root/org-tenant1/zone-trustedServers-0">
            <policyZoneCondition id="1" order="1">
               <policyZoneExpression opr="eq">
                  <policyParentAppName id="1" value="BuildServer" />
               </policyZoneExpression>
            </policyZoneCondition>
         </policyZone>
      </pair>
   </inConfigs>
</configConfMos>
```

Response

```
<configConfMos
   cookie="<real_cookie>"
   commCookie="7/15/0/1a6"
   srcExtSys="10.193.33.221"
   destExtSys="10.193.33.221"
   srcSvc="sam_extXMLApi"
   destSvc="policy-mgr_dme"
   response="yes">
   <outConfigs>
      <pair key="org-root/org-tenant0/zone-zone0">
         <policyZone
            descr=""
            dn="org-root/org-tenant0/zone-zone0"
            intId="24295"
            name="zone0"
            status="created"/>
      </pair>
      <pair key="org-root/org-tenant1/zone-trustedServers-0">
         <policyZone
            descr=""
            dn="org-root/org-tenant1/zone-trustedServers-0"
            intId="24404"
            name="trustedServers-0"
            status="created"/>
      </pair>
      <pair key="org-root/org-tenant1/zone-trustedClients-0">
         <policyZone
            descr=""
            dn="org-root/org-tenant1/zone-trustedClients-0"
            intId="24408"
            name="trustedClients-0"
            status="created"/>
      </pair>
   </outConfigs>
</configConfMos>
```

Object Group

The following example creates an object group named ftpPorts0 and assigns a set of attributes.

Request

```
POST URL: https://10.193.33.221/xmlIM/policy-mgr
XML API payload:
```

```
<configConfMos
    cookie="<real_cookie>">
    <inConfigs>
        <pair key="org-root/org-tenant0/objgrp-ftpPorts0">
            <policyObjectGroup dn="org-root/org-tenant0/objgrp-ftpPorts0">
                <policyObjectGroupExpression id="1" order="1" opr="eq">
                    <policyNetworkPort id="1" value="20" />
                </policyObjectGroupExpression>
                <policyObjectGroupExpression id="2" order="2" opr="eq">
                    <policyNetworkPort id="1" value="21" />
                </policyObjectGroupExpression>
            </policyObjectGroup>
        </pair>
    </inConfigs>
</configConfMos>
```

Response

```
<configConfMos
    cookie="<real_cookie>"
    commCookie="7/15/0/1a4"
    srcExtSys="10.193.33.221"
    destExtSys="10.193.33.221"
    srcSvc="sam_extXMLApi"
    destSvc="policy-mgr_dme"
    response="yes">
    <outConfigs>
        <pair key="org-root/org-tenant0/objgrp-ftpPorts0">
            <policyObjectGroup
                attributeName=""
                descr=""
                dn="org-root/org-tenant0/objgrp-ftpPorts0"
                intId="24265"
                name="ftpPorts0"
                status="created"/>
        </pair>
    </outConfigs>
</configConfMos>
```

Attribute Dictionary

The following example creates a dictionary that defines the various attribute IDs and names.

Request

```
POST URL: https://10.193.33.221/xmlIM/policy-mgr
XML API payload:
<configConfMos
    cookie="<real_cookie>">
    <inConfigs>
<!-- Create Sample VnspCustomDictionary under org-tenant1 -->
        <pair key="org-root/attr-dict-custom-userAttrs">
            <policyVnspCustomDictionary dn="org-root/attr-dict-custom-userAttrs">
                <policyVnspCustomAttr dataType="string" id="1" name="userAttr1" />
                <policyVnspCustomAttr dataType="string" id="2" name="userAttr2" />
                <policyVnspCustomAttr dataType="string" id="3" name="dept" />
                <policyVnspCustomAttr dataType="string" id="4" name="production" />
            </policyVnspCustomDictionary>
        </pair>
    </inConfigs>
</configConfMos>
```

Response

```
<configConfMos
    cookie="<real_cookie>"
    commCookie="7/15/0/1a3"
    srcExtSys="10.193.33.221"
    destExtSys="10.193.33.221"
    srcSvc="sam_extXMLApi"
    destSvc="policy-mgr_dme"
    response="yes">
    <outConfigs>
        <pair key="org-root/attr-dict-custom-userAttrs">
            <policyVnspCustomDictionary
                descr=""
                dn="org-root/attr-dict-custom-userAttrs"
                intId="24245"
                name="userAttrs"
                status="created"/>
        </pair>
    </outConfigs>
</configConfMos>
```

Policy

Beginning with version 2.0, Prime Network Services Controller no longer uses the adminState property for ACL policies because VSG compute firewalls do not support a value of disabled for this property; the default value is enabled. However, Prime Network Services Controller continues to use the adminState property in other types of policies, such as those used by ASA 1000V.

If you set the adminState property via the API for an ACL policy, the response will contain the following error message:

```
<configConfMos
    cookie="<real_cookie>"
    commCookie="7/12/0/55"
    srcExtSys="10.193.76.15"
    destExtSys="10.193.76.15"
    srcSvc="sam_extXMLApi"
    destSvc="policy-mgr_dme"
    response="yes"
    errorCode="170"
    invocationResult="unidentified-fail"
    errorDescr="Admin implicit props cannot be modified, prop=adminState>
```

The following example creates a policy named trustedHosts and sets the rules it can use.

Request

```
POST URL: https://10.193.33.221/xmlIM/policy-mgr
XML API payload:
<configConfMos
    cookie="<real_cookie>">
    <inConfigs>
        <pair key="org-root/org-tenant1/pol-trustedHosts">
            <policyRuleBasedPolicy dn="org-root/org-tenant1/pol-trustedHosts">
                <policyRule name="allowSsh" order="1">
<!-- This rule allows all VMs in zone "trustedClients" to initiate an SSH connection
to VMs in zone "trustedServers" -->
                <policyRuleCondition id="100" order="1">
                    <policyNetworkExpression opr="eq">
                    <policyNwAttrQualifier attrEp="source"/>
                    <policyZoneNameRef id="1" value="trustedClients-0" />
                    </policyNetworkExpression>
                </policyRuleCondition>
                <policyRuleCondition id="101" order="20">
                    <policyNetworkExpression opr="eq">
                    <policyNwAttrQualifier attrEp="destination"/>
                    <policyZoneNameRef id="1" value="trustedServers-0" />
                    </policyNetworkExpression>
                </policyRuleCondition>
                <policyRuleCondition id="103" order="30">
                    <policyNetworkExpression opr="eq">
                    <policyNwAttrQualifier attrEp="destination"/>
                    <policyNetworkPort id="1" placement="0" value="22" />
                    </policyNetworkExpression>
                </policyRuleCondition>
                <fwpolicyAction actionType="permit"/>
                </policyRule>
                <policyRule name="allowTacacs" order="2">
                <fwpolicyAction actionType="permit"/>
                </policyRule>
            </policyRuleBasedPolicy>
        </pair>
    </inConfigs>
</configConfMos>
```

Response

```
<configConfMos
   cookie="<real_cookie>"
   commCookie="7/15/0/1b5"
   srcExtSys="10.193.33.221"
   destExtSys="10.193.33.221"
   srcSvc="sam_extXMLApi"
   destSvc="policy-mgr_dme"
   response="yes">
   <outConfigs>
      <pair key="org-root/org-tenant1/pol-trustedHosts">
         <policyRuleBasedPolicy
            descr=""
            dn="org-root/org-tenant1/pol-trustedHosts"
            intId="25131"
            name="trustedHosts"
            status="created"/>
      </pair>
   </outConfigs>
</configConfMos>
```

PolicySet

The following example creates ACL-PolicySet and sets the order in which policies are applied.

Request

```
<configConfMos
   cookie="<real_cookie>"
   inHierarchical="false">
   <inConfigs>
      <pair key="org-root/org-tenant1/pset-ACL-PolicySet/polref-Test">
         <policyPolicyNameRef
            dn="org-root/org-tenant1/pset-ACL-PolicySet/polref-Test"
            order="100"
            policyName="Test"
            status="created"/>
      </pair>
      <pair key="org-root/org-tenant1/pset-ACL-PolicySet">
         <policyPolicySet
            descr=""
            dn="org-root/org-tenant1/pset-ACL-PolicySet"
            name="ACL-PolicySet"
            status="created"/>
      </pair>
      <pair key="org-root/org-tenant/pset-ACL-PolicySet/polref-Test-03">
         <policyPolicyNameRef
            dn="org-root/org-tenant/pset-ACL-PolicySet/polref-Test-03"
            order="300"
            policyName="Test-03"
            status="created"/>
      </pair>
      <pair key="org-root/org-tenant1/pset-ACL-PolicySet/polref-Test-02">
         <policyPolicyNameRef
            dn="org-root/org-tenant1/pset-ACL-PolicySet/polref-Test-02"
            order="200"
            policyName="Test-02"
            status="created"/>
      </pair>
   </inConfigs>
</configConfMos>
```

Response

```
<configConfMos
   cookie="<real_cookie>"
   commCookie="7/12/0/187c"
   srcExtSys="172.20.101.150"
   destExtSys="172.20.101.150"
   srcSvc="sam_extXMLApi"
   destSvc="policy-mgr_dme"
   response="yes">
   <outConfigs>
      <pair key="org-root/org-tenant1/pset-ACL-PolicySet">
         <policyPolicySet
            adminState="enabled"
            descr="" dn="org-root/org-tenant1/pset-ACL-PolicySet"
            intId="10666"
            name="ACL-PolicySet"
            status="created"/>
      </pair>
      <pair key="org-root/org-tenant1/pset-ACL-PolicySet/polref-Test">
         <policyPolicyNameRef
            dn="org-root/org-tenant1/pset-ACL-PolicySet/polref-Test"
            order="100"
            policyName="Test"
            status="created"/>
      </pair>
      <pair key="org-root/org-tenant1/pset-ACL-PolicySet/polref-Test-02">
         <policyPolicyNameRef
            dn="org-root/org-tenant1/pset-ACL-PolicySet/polref-Test-02"
            order="200"
            policyName="Test-02"
            status="created"/>
      </pair>
      <pair key="org-root/org-tenant1/pset-ACL-PolicySet/polref-Test-03">
         <policyPolicyNameRef
            dn="org-root/org-tenant1/pset-ACL-PolicySet/polref-Test-03"
            order="300"
            policyName="Test-03"
            status="created"/>
      </pair>
   </outConfigs>
</configConfMos>
```

Compute Security Profile

The following example creates a security profile named vnsp-sp1 and assigns the VNSP to it.

Request

```
POST URL: https://10.193.33.221/xmlIM/policy-mgr
XML API payload:
<configConfMos
cookie="<real_cookie>">
<inConfigs>
<pair key="org-root/org-tenant0/vnsp-sp1">
   <policyVirtualNetworkServiceProfile
      dn="org-root/org-tenant0/vnsp-sp1"
      policySetNameRef="myPolicySet0">
      <policyVnspAVPair id="1">
         <policyAttributeDesignator attrName="dept"/>
         <policyAttributeValue value="DEV" />
      </policyVnspAVPair>
      </policyVirtualNetworkServiceProfile>
      </pair>
   </inConfigs>
</configConfMos>
```

Response

```
<configConfMos
   cookie="<real_cookie>"
   commCookie="7/15/0/1ac"
   srcExtSys="10.193.33.221"
   destExtSys="10.193.33.221"
   srcSvc="sam_extXMLApi"
   destSvc="policy-mgr_dme"
   response="yes">
   <outConfigs>
      <pair key="org-root/org-tenant0/vnsp-sp1">
         <policyVirtualNetworkServiceProfile
            descr=""
            dn="org-root/org-tenant0/vnsp-sp1"
            intId="24512"
            name="sp1"
            policySetNameRef="myPolicySet0"
            status="created"
            vnspId="2"/>
      </pair>
   </outConfigs>
</configConfMos>
</configResolveClass>
```

InterCloud Management

The following topics describe how Prime Network Services Controller XMP API supports InterCloud management:

- InterCloud Infrastructure Setup
- InterCloud Infrastructure Creation Examples
- InterCloud VM Migration Management Examples

InterCloud Infrastructure Setup

The Prime Network Services Controller XMP API accesses the InterCloud framework by invoking calls to resource-management (/resource-mgr in the url). It instantiates the InterCloud extender switch on the private side and the InterCloud switch on Amazon Web Service (AWS) and creates the link between cloud providers. The InterCloud framework also creates and manages VM lifecycle management for InterClouds. Currently suborganizations and multi-tenancy are not supported in the InterCloud infrastructure.

InterCloud Infrastructure Creation Examples

The following are some examples of API calls to create the InterCloud infrastructure:

- InterCloud Public Provider Account Creation
- InterCloud Public Provider Account Creation Response

InterCloud Public Provider Account Creation

The following post can be used to create a TESTME provider account in AWS:

```
<configConfMos
  cookie="<real_cookie>">
 <inConfigs>
   <pair key="hcloud/cp-TESTME"/>
    <hcloudProvider dn="hcloud/cp-TESTME"
    name=\"TESTME"
    username="account-ID"
    password="account-key"
   type="Amazon"
 status="created"/>
</hcloudProvider>
</pair>
</inConfigs>
</configConfMos>
```

InterCloud Public Provider Account Creation Response

```
<configConfMos
  cookie="<real_cookie>"
  commCookie="5/12/0/2e5"
 srcExtSys="173.36.217.30" destExtSys="173.36.217.30"
 srcSvc="sam_extXMLApi"
 destSvc="resource-mgr_dme"
   response="yes">
  <outConfigs>
<pair key="hcloud/cp-TESTME"/>
  <hcloudProvider  defaultLocation=""  dn="hcloud/cp-TESTME"
    fsmDescr=""
    fsmPrev="nop"
    fsmProgr="0"
    fsmRmtInvErrCode="none"
    fsmRmtInvErrDescr=""
    fsmRmtInvRslt=""
    fsmStageDescr=""
    fsmStamp="never"
    fsmStatus="nop"
    fsmTry="0"
```

```
        name="TESTME"
        status="created"
      type="Amazon"
      username="account-ID"/>
    </pair>
      </outConfigs>
    </configConfMos>
```

InterCloud Amazon VPC Creation

```
<configConfMos
    cookie="<real_cookie> ">
        <inConfigs>
        <pair key="hcloud-root/vpc-vpc_name"/>
            <hcloudVpc dn="hcloud-root/vpc-vpc_name"
                name="vpc_name"
                status="created"
              cloudProviderDn="hcloud/cp-provider_account_name"
              cpRegionDn="hcloud/cp-provider_account_name/reg-us-east-1"
                macAddressPoolDn="hcloud/mac-pool-default-macpool"
                defaultVsmDn="infra-root/cvsm_to_use"/>
            </hcloudVpc>
        </pair>
        </inConfigs>
</configConfMos>
```

InterCloud Extender Image Creation

```
    <configConfMos cookie=”<real_cookie>">
        <inConfigs>
        <pair key="hcloud/infra-img-Ics-image"/>
          <hcloudInfraImage dn = "hcloud/infra-img-Ics-image"
          rn="infra-img-Ics-image"
          name="infra-img-Ics-image”
          format="Ami"
          type="Ics"
          version="11"
          status="created"/>
          </hcloudInfraImage>
        </pair>
        </inConfigs>
    </configConfMos>"""
```

InterCloud Extender Image Upload

```
    <configConfMos cookie="<real_cookie>">
        <inConfigs>
        <pair key="hcloud/infra-img-Ics-image/infra-import"/>
          <hcloudInfraImageImporter dn ="hcloud/infra-img-Ics-image/infra-import"
          rn="infra-import"
          user="root"
          hostname="HostName-or-IP"
          pwd="tsburocks"
          remoteFile="Ics_image_path"
          status="created"/>
          </hcloudInfraImageImporter>
        </pair>
        </inConfigs>
    </configConfMos>
```

InterCloud Link Creation

```
    <configConfMos cookie="<real_cookie>" inHierarchical="false">
      <inConfigs>\
        <pair key="hcloud-root/vpc-vpc_name"/>
        <hcloudCne dn="hcloud-root/vpc_name/cne-cne_name"
          name="cne_link_name"
          status="created"
          haMode="standalone"
      vsmDn="infra-root/cvsm_to_use"/>
          <hcloudIcs name="link_name" status="created"
              <hcloudIcsInst name="inst-1"
              imageDn="hcloud/infra-img-Ics-image_name"
              status="created"
                  <hcloudIcsVemInterface
                   role="Management"
                   id="1"
                   status="created"
                  <hcloudIcsVemInterface
                   role="TunnelTrunk"
                   id="2"
                   status="created"
              </hcloudIcsInst>
          </hcloudIcs>
          <hcloudIcx name="link_name" status="created"/>
              <hcloudIcxInst name="inst-1"
              status="created">
                  <hcloudIcxVnic id="1"
                   role="Management"
                   status="created"/>
                  <hcloudIcxVnic id="2"
                   role="DataTrunk”
                   status="created"/>
                  <hcloudIcxVnic id="3"
                   role="Tunnel"
                   status="created"/>
                  <hcloudIcxVemInterface id="1"
                   role="EnterpriseTrunk"
                   status="created"/>
                  <hcloudIcxVemInterface id="2"
                   role="TunnelTrunk"
                   status="created"/>
              <resResourceBinding dn="hcloud-root/vpc-vpc_name/cne-cne_name/Icx-
cln/Icxinst-cne_name-cln-1/binding"
                  assignedToDn="hcloud/Icx_to_use"
                     status="created"
              </resResourceBinding>
              </hcloudIcxInst>
          </hcloudIcx>
        </hcloudCne>
      </pair>
    </inConfigs>
  </configConfMos>
```

InterCloud VM Migration Management Examples

The following topics illustrate some possible interaction with VM management and the InterCloud framework.

- VM Property Queries
- InterCloud Bundled Image Import
- InterCloud Template Creation from Imported VM Image

- InterCloud VM Creation From A Template
- InterCloud VM Status Monitoring

VM Property Queries

In these examples, we query resource-manager for VM properties which are necessary for a migration call to take a certain VM and migrate it to a public cloud provider. AWS is the public cloud provider in these examples.

- Get Folder Info Request
- Get Folder Info Response
- Get VM Info Request
- Get VM Info Response
- Move VM Into Cloud Request

Invoke a query to find the folder DN (replace 'HOST-IP-ADDRESS' with hostname or IP).

Get Folder Info Request

```
<configResolveClass
  cookie="<real_cookie>"
    inHierarchical="false" classId="vcenterFolder">
  <inFilter>
    <eq class="vcenterFolder" property="name" value="HOST-IP-ADDRESS" />
  </inFilter>
</configResolveClass>
```

Get Folder Info Response

```
<configResolveClass cookie="<real_cookie>"
 srcExtSys="10.5.111.80" destExtSys="10.5.111.80"   srcSvc="sam_extXMLApi"
destSvc="resource-mgr_dme" response="yes" classId="vmVmInstEp">
   <outConfigs>
  <vmVmInstEp deleteAfterMigration="no" descr="" dn="vmmEp/vm-mgr-InterCloud-
VC/folder-datacenter-915/folder-domain-c920/folder-host-922/vmInstEp-501cc5bd-
bdad-b3c3-9639-006ddaa7cd79" fsmDescr="" />
    </outConfigs>
       </configResolveClass>
```

A possible filter on the response can grab the necessary information of the DN value.

Get VM Info Request

```
<configResolveClass
  cookie="
  inHierarchical="false"
  classId="vmVmInstEp">
<inFilter>
  <and>
    <eq class="vmVmInstEp"
           property="name"
           value="WEB-VM-3"
    <wcard class="vmVmInstEp"
           property="dn"
           value vmmEp/vm-mgr-InterCloud-VC/folder-datacenter-915/folder-domain-
c920/folder-host-922/vmInstEp-501cc5bd-bdad-b3c3-9639-006ddaa7cd79" />
  </and>
</inFilter>
</configResolveClass>
```

Get VM Info Response

```
<configResolveClass cookie="<real_cookie>" commCookie="5/12/0/a94f"
       srcExtSys="10.5.111.80"
       destExtSys="10.5.111.80"
       srcSvc="sam_extXMLApi" destSvc="resource-mgr_dme" response="yes"
   classId="vmVmInstEp"/>
```

```
    <outConfigs>
     <vmVmInstEp deleteAfterMigration="no" descr="" dn="vmmEp/vm-mgr-InterCloud-
   VC/folder-datacenter-915/folder-domain-c920/folder-host-922/vmInstEp-501cc5bd-
   bdad-b3c3-9639-006ddaa7cd79" fsmDescr=""
           fsmPrev="RefreshEnterpriseVmDetailsSuccess" fsmProgr="100"
             fsmRmtInvErrCode="none" fsmRmtInvErrDescr="" fsmRmtInvRslt=""
   fsmStageDescr=""     fsmStamp="2013-08-27T16:34:02.153" fsmStatus="nop"
    fsmTry="0" isMigrable="no"  isTemplate="no" name="Web-VM-3" refresh="no"
    uuid="501cc5bd-bdad-b3c3-9639-006ddaa7cd79" vmId="vm-1121" vmInstDn="" />
     </outConfigs>
  </configResolveClass>
```

A possible filter on the response can grab the necessary information of uuid, VM (Web-VM-3 in this example).

Move VM Into Cloud Request

```
<configConfMos
cookie="">
  <inConfigs>
   <pair key="hcloud-root/vpc-VPC-NAME/vm-VM-NAME">
    <hcloudVm dn="hcloud-root/vpc-VPC-NAME/vm-VM-NAME" icSwitchDn="hcloud-
root/vpc-VPC-NAME/icl-IC-LINK-NAME/ics-ics"  srcVmInstEpDn="DN-VALUE"
sshUser="root" status="created" vmCycle="create"/>
</pair>
   <pair key="hcloud-root/vpc-VPC-NAME/vm-VM-NAME/storage-res">
    <storageResource diskSize="6" dn="hcloud-root/vpc-VPC-NAME/vm-VM-
NAME/storage-res"/>
</pair>
   <pair key="hcloud-root/vpc-VPC-NAME/vm-VM-NAME/compute-res">
    <computeResource actualCpu="1" actualMemorySize="2048" cpu="1" dn="hcloud-
root/vpc-VPC-NAME/vm-VM-NAME/compute-res" memorySize="1024"/>
</pair>
   <pair key="DN-VALUE/os">
    <computeOS architecture="64bit" combinedName="RHEL_6.3_64bit" dn="DN-
VALUE/os" os="RHEL" version="Unknown"/>
</pair>
   <pair key="hcloud-root/vpc-VPC-NAME/vm-VM-NAME/vnic-1">
    <hcloudVmVnic dn="hcloud-root/vpc-VPC-NAME/vm-VM-NAME/vnic-1" index="1"
portProfileName="PORT-PROFILE"  status="created"/>
</pair>
  </inConfigs>
</configConfMos>
```

In this example, the following values need to be passed on to this call:

- VPC-NAME – Name created for the AWS VPC.
- VM-NAME – Value taken from the Get VM info.
- DN-VALUE – Value taken from the Get Folder info.
- PORT-PROFILE – Static variable defining the networking placement in the cloud (Nexus1000v PP).

InterCloud Bundled Image Import

To import a bundled image, create an hcloudBundledImage Mo and add hcloudInfraImageImporter Mo under that hcloudBundledImage Mo as a child.

The following is an API request example to import “Test” BundledImage.

```
<configConfMos
 cookie="<real_cookie>"
 commCookie="5/12/0/1a80"
 srcExtSys="172.25.97.162"
 destExtSys="172.25.97.162"
 srcSvc="sam_extXMLApi"
 destSvc="resource-mgr_dme"
 inHierarchical="no">
```

```
  <inConfigs>
<pair key="infra-root/bundle-img-Test">
  <hcloudBundledImage
  descr=""
  dn="infra-root/bundle-img-Test"
  format="None"
  markDelete="no"
  name="Test"
  status="created"/>
</pair>
<pair key="infra-root/bundle-img-Test/infra-import">
  <hcloudInfraImageImporter
  action="merge"
  adminState="enabled"
  atVMLevel="no"
  descr=""
  dn="infra-root/bundle-img-Test/infra-import"
  hostname="10.22.181.57"
  proto="scp"
  remoteFile="/Test.zip"
  status="created"
  user="username"/>
</pair>
  </inConfigs>
</configConfMos>
```

After this API request, Prime Network Services Controller immediately replies with the following API response:

```
<configConfMos
 cookie="<real_cookie>"
 commCookie="5/12/0/1a80"
 srcExtSys="172.25.97.162"
 destExtSys="172.25.97.162"
 srcSvc="sam_extXMLApi"
 destSvc="resource-mgr_dme"
 response="yes"
 errorCode="0"
 errorDescr="">
   <outConfigs>
 <pair key="infra-root/bundle-img-Test">
   <hcloudBundledImage
   absTaskMoRef=""
   deleteStatus="none"
   descr=""
   dn="infra-root/bundle-img-Test"
   fileSize="0"
   filename=""
   format="None"
   fsmDescr=""
   fsmPrev="nop"
   fsmProgr="0"
   fsmRmtInvErrCode="none"
   fsmRmtInvErrDescr=""
   fsmRmtInvRslt=""
   fsmStageDescr=""
   fsmStamp="never"
   fsmStatus="nop"
   fsmTry="0"
   intId="17399"
   markDelete="no"
   name="Image56"
   resourceId="00000000-0000-0000-0000-000000000000"
   status="created"
   version=""/>
```

```
    </pair>
    <pair key="infra-root/bundle-img-Test/infra-import">
      <hcloudInfraImageImporter
      action="merge"
      adminState="enabled"
      atVMLevel="no"
      descr=""
      dn="infra-root/bundle-img-Test/infra-import"
      fsmDescr=""
      fsmPrev="nop"
      fsmProgr="0"
      fsmRmtInvErrCode="none"
      fsmRmtInvErrDescr=""
      fsmRmtInvRslt=""
      fsmStageDescr=""
      fsmStamp="never"
      fsmStatus="nop"
      fsmTry="0"
      hostname="10.22.181.57"
      intId="17400"
      name=""
      opStatus="not-started"
      postAction="none"
      proto="scp"
      remoteFile="/Test.zip"
      status="created"
      statusReport=""
      user="username"/>
    </pair>
      </outConfigs>
    </configConfMos>
```

After receiving an immediate response from Prime Network Services Controller, the API user must subscribe to MoChangeEvent on the hcloudBundledImage Mo. The user will be notified when Task Mo is created for hcloudBundledImage Mo. In this example, the DN of Task Mo is "operationEp/task-54".

```
   <configMoChangeEvent
    cookie=""
    commCookie=""
    srcExtSys="0.0.0.0"
    destExtSys="0.0.0.0"
    srcSvc="resource-mgr_dme"
    destSvc="sam_extXMLApi"
    inEid="7511">
      <inConfig>
      <hcloudBundledImage
      absTaskMoRef="operationEp/task-54"
      dn="infra-root/bundle-img-Test"
      filename="Test_Test.zip"
      status="modified"/>
      </inConfig>
    </configMoChangeEvent>
```

After Task Mo is created, the user must subscribe to the event on Task Mo. When Task is done, the user will get a completed response similar to the following:

```
   <configMoChangeEvent
    cookie=""
    commCookie=""
    srcExtSys="0.0.0.0"
    destExtSys="0.0.0.0"
    srcSvc="resource-mgr_dme"
    destSvc="sam_extXMLApi"
    inEid="7571">
      <inConfig>
      <operationTask
      description="COMPLETED: download image to
   NSC(FSM:sam:dme:ImageAbsImageImporterDownloadImage)"
      dn="operationEp/task-54"
      finishedTime="2013-09-30T22:01:16.195"
      opState="completed"
      status="modified"/>
      </inConfig>
    </configMoChangeEvent>
```

InterCloud Template Creation from Imported VM Image

To create a template from an imported VM image, the API user needs to create a hcloudVmProviderImage Mo and add the following Mos under that hcloudVmProviderImage Mo as children: computeOs, computeResource, storageResource and hcloudVmVnicTemplate.

The following is an API request example to create an "OvaTemplate" template from an imported OVA image.

```
  <configConfMos
  cookie="<real_cookie>"
  commCookie="5/12/0/e2"
  srcExtSys="172.25.97.162"
  destExtSys="172.25.97.162"
  srcSvc="sam_extXMLApi"
  destSvc="resource-mgr_dme"
  inHierarchical="no">
  <inConfigs>
  <pair key="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate">
    <hcloudVmProviderImage
    adminState="deploy"
    deployState="undeployed"
    deploymentId=""
    dn="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate"
    driverImageDn=""
    imageDn="org-root/vm-img-ova1Image1"
    imageId=""
    markDelete="no"
    name="OvaTemplate"
    srcVmInstEpDn=""
    sshUser="root"
    status="created"
    type="Vm"/>
  </pair>
  <pair key="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate/os">
    <computeOs
    architecture="64bit"
    combinedName="RHEL_6.3_64bit"
    dn="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate/os"
    fsType=""
    os="RHEL"
    status="created"
    version="Unknown"/>
  </pair>
   <pair key="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate/compute-res">
    <computeResource
    actualCpu="1"
    actualMemorySize="1024"
    cpu="1"
    dn="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate/compute-res"
    memorySize="1024"
    status="created"/>
  </pair>
  <pair key="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate/storage-res">
    <storageResource
```

```
      diskSize="6"
      dn="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate/storage-res"
      status="created"/>
    </pair>
    <pair key="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate/intf-template-1">
      <hcloudVmVnicTemplate
      dn="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate/intf-template-1"
      index="1"
      portProfileName="ppa"
      status="created"/>
    </pair>
      </inConfigs>
    </configConfMos>
```

After the API request, Prime Network Services Controller immediately replies with the following API response:

```
     <configConfMos
    cookie="<real_cookie>"
    commCookie="5/12/0/e2"
    srcExtSys="172.25.97.162"
    destExtSys="172.25.97.162"
    srcSvc="sam_extXMLApi"
    destSvc="resource-mgr_dme"
    response="yes"
    errorCode="0"
    errorDescr="">
      <outConfigs>
    <pair key="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate">
      <hcloudVmProviderImage
      absTaskMoRef=""
      adminState="deploy"
      cpmRequestId="1970-01-01T00:00:00.000"
      deleteStatus="none"
      deployState="undeployed"
      deploymentId=""
      dn="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate"
      driverImageDn=""
      fsmDescr=""
      fsmFlags=""
      fsmPrev="nop"
      fsmProgr="0"
      fsmRmtInvErrCode="none"
      fsmRmtInvErrDescr=""
      fsmRmtInvRslt=""
      fsmStageDescr=""
      fsmStamp="never"
      fsmStatus="nop"
      fsmTry="0"
    imageDn="org-root/vm-img-ova1Image1"
      imageId=""
      markDelete="no"
      name="OvaTemplate"
      resourceId="00000000-0000-0000-0000-000000000000"
      srcDescription=""
      srcVmInstEpDn=""
      sshUser="root"
      status="created"
      type="Vm"/>
    </pair>
    <pair key="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate/os">
      <computeOs
      architecture="64bit"
      combinedName="RHEL_6.3_64bit"
      dn="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate/os"
      fsType=""
      fullName=""
      os="RHEL"
      status="created"
      version="Unknown"/>
    </pair>
    <pair key="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate/compute-res">
      <computeResource
      actualCpu="1"
      actualMemorySize="1024"
      cpu="1"
      dn="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate/compute-res"
      memorySize="1024"
      status="created"/>
    </pair>
    <pair key="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate/storage-res">
      <storageResource
      actualDiskSize="10"
      diskSize="6"
      dn="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate/storage-res"
      status="created"/>
    </pair>
    <pair key="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate/intf-template-1">
      <hcloudVmVnicTemplate
      dn="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate/intf-template-1"
      guestOsStatus="up"
      index="1"
      portProfileName="ppa"
      status="created"/>
    </pair>
      </outConfigs>
    </configConfMos>
```

After receiving immediate response from Prime Network Services Controller, the API user must subscribe to the MoChangeEvent on hcloudVmProviderImage Mo. The user will be notified when Task Mo is created for hcloudVmProviderImage Mo. In this example, DN of Task Mo is "operationEp/task-8".

```
    <configMoChangeEvent
    cookie=""
    commCookie=""
    srcExtSys="0.0.0.0"
    destExtSys="0.0.0.0"
    srcSvc="resource-mgr_dme"
    destSvc="sam_extXMLApi"
    inEid="817">
      <inConfig>
      <hcloudVmProviderImage
      absTaskMoRef="operationEp/task-8"
      cpmRequestId="2013-09-26T01:04:34.408"
      deployState="deploying"
      dn="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate"
      fsmDescr="Creating a ProviderImage OvaTemplate in the
   Cloud(FSM:sam:dme:HcloudProviderImageCreateProviderImage)"
      fsmFlags="sam:dme:HcloudProviderImageCreateProviderImage:ovf-image-
   config,sam:dme:HcloudProviderImageDeleteImage:ovf-image-config"
      fsmPrev="CreateProviderImagePreprocessOvfImage"
      fsmProgr="1"
      fsmStageDescr="Prepare an Ovf image for conversion.(FSM-
   STAGE:sam:dme:HcloudProviderImageCreateProviderImage:PreprocessOvfImage)"
      fsmStamp="2013-09-26T01:04:34.410"
      fsmStatus="CreateProviderImagePreprocessOvfImage"
      fsmTry="1"
      resourceId="0004e73e-f3ff-0991-0004-e73ef3ff0991"
      status="modified"/>
      </inConfig>
    </configMoChangeEvent>
```

After Task Mo is created, the user must subscribe to the event in Task Mo. When the Task is done, the user will get a completed response similar to the following:

```
    <configMoChangeEvent
    cookie=""
    commCookie=""
    srcExtSys="0.0.0.0"
    destExtSys="0.0.0.0"
    srcSvc="resource-mgr_dme"
    destSvc="sam_extXMLApi"
    inEid="1000">
      <inConfig>
      <operationTask
      description="COMPLETED: Creating a ProviderImage OvaTemplate in the
   Cloud(FSM:sam:dme:HcloudProviderImageCreateProviderImage)"
      dn="operationEp/task-8"
      finishedTime="2013-09-26T01:17:15.023"
      opState="completed"
      status="modified"/>
      </inConfig>
    </configMoChangeEvent>
```

InterCloud VM Creation From A Template

To create a VM in a cloud, the API user must create an hcloudVm Mo and add the following Mos under that hcloudVm Mo as children: hcloudVmVnic, computeResource and storageResource .

The following is an API request example to create “TestVM” VM from a template.

```
   <configConfMos
    cookie="<real_cookie>"
    commCookie="5/12/0/24d"
    srcExtSys="172.25.97.162"
    destExtSys="172.25.97.162"
    srcSvc="sam_extXMLApi"
    destSvc="resource-mgr_dme"
    inHierarchical="no">
    <inConfigs>
    <pair key="hcloud-root/vpc-VPc1/vm-TestVM">
      <hcloudVm
      cpImageDn="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate"
      defaultGateway="0.0.0.0"
      defaultGwIntfIndex="0"
      descr=""
      dn="hcloud-root/vpc-VPc1/vm-TestVM"
      domainName=""
      driverImageDn=""
      icSwitchDn="hcloud-root/vpc-VPc1/icl-Cne1/ics-ics"
      name="TestVM"
      nameServer1="0.0.0.0"
      nameServer2="0.0.0.0"
      srcVmInstEpDn=""
      sshUser="root"
      status="created"
      uuid="00000000-0000-0000-0000-000000000000"
      vmCycle="create"/>
    </pair>
    <pair key="hcloud-root/vpc-VPc1/vm-TestVM/vnic-1">
      <hcloudVmVnic
      descr=""
      dn="hcloud-root/vpc-VPc1/vm-TestVM/vnic-1"
      index="1"
      isIpViaDHCP="yes"
      name=""
      portProfileName="ppa"
      status="created"/>
    </pair>
    <pair key="hcloud-root/vpc-VPc1/vm-TestVM/compute-res">
      <computeResource
      actualCpu="1"
      actualMemorySize="1024"
      cpu="1"
      dn="hcloud-root/vpc-VPc1/vm-TestVM/compute-res"
      memorySize="1024"
      status="created"/>
    </pair>
    <pair key="hcloud-root/vpc-VPc1/vm-TestVM/storage-res">
      <storageResource
      diskSize="6"
      dn="hcloud-root/vpc-VPc1/vm-TestVM/storage-res"
      status="created"/>
    </pair>
      </inConfigs>
    </configConfMos>
```

After this API request, Prime Network Services Controller immediately replies with the following API response:

```
   <configConfMos
  cookie="<real_cookie>"
  commCookie="5/12/0/24d"
  srcExtSys="172.25.97.162"
  destExtSys="172.25.97.162"
  srcSvc="sam_extXMLApi"
  destSvc="resource-mgr_dme"
  response="yes"
  errorCode="0"
  errorDescr="">
    <outConfigs>
  <pair key="hcloud-root/vpc-VPc1/vm-TestVM">
    <hcloudVm
    absTaskMoRef=""
    cloudInstanceId=""
    cpImageDn="hcloud-root/vpc-VPc1/cp-vm-OvaTemplate"
    cpmRequestId="1970-01-01T00:00:00.000"
    createTime="1970-01-01T00:00:00.000"
    defaultGateway="0.0.0.0"
    defaultGwIntfIndex="0"
    descr=""
    dn="hcloud-root/vpc-VPc1/vm-TestVM"
    domainName=""
    driverImageDn=""
    fsmDescr=""
    fsmFlags=""
    fsmPrev="nop"
    fsmProgr="0"
    fsmRmtInvErrCode="none"
    fsmRmtInvErrDescr=""
    fsmRmtInvRslt=""
    fsmStageDescr=""
    fsmStamp="never"
    fsmStatus="nop"
    fsmTry="0"
    icLinkNameRef=""
    icSwitchDn="hcloud-root/vpc-VPc1/icl-Cne1/ics-ics"
    intId="11013"
    name="TestVM"
     nameServer1="0.0.0.0"
    nameServer2="0.0.0.0"
    powerState="off"
    resourceId="00000000-0000-0000-0000-000000000000"
```

```
        srcDescription=""
        srcVmInstEpDn=""
        sshHostPubKey=""
        sshUser="root"
        status="created"
        statusDn=""
        tenantDn=""
        uuid="00000000-0000-0000-0000-000000000000"
        vmCycle="create"
        vmInstDn=""
        vmState="ok"/>
      </pair>
      <pair key="hcloud-root/vpc-VPc1/vm-TestVM/vnic-1">
        <hcloudVmVnic
        descr=""
        dn="hcloud-root/vpc-VPc1/vm-TestVM/vnic-1"
        guestOsStatus="up"
        index="1"
        intId="11014"
        isIpViaDHCP="yes"
        macAddress="00:00:00:00:00:00"
        name=""
        portId="0"
        portProfileName="ppa"
        status="created"/>
      </pair>
      <pair key="hcloud-root/vpc-VPc1/vm-TestVM/compute-res">
        <computeResource
        actualCpu="1"
        actualMemorySize="1024"
        cpu="1"
        dn="hcloud-root/vpc-VPc1/vm-TestVM/compute-res"
        memorySize="1024"
        status="created"/>
      </pair>
      <pair key="hcloud-root/vpc-VPc1/vm-TestVM/storage-res">
        <storageResource
        actualDiskSize="10"
        diskSize="6"
        dn="hcloud-root/vpc-VPc1/vm-TestVM/storage-res"
        status="created"/>
      </pair>
        </outConfigs>
      </configConfMos>
```

After receiving an immediate response from Prime Network Services Controller, the API user must subscribe to the MoChangeEvent on hcloudVm Mo. The user will be notified when Task Mo is created for hcloudVm Mo. In this example, DN of created Task Mo is "operationEp/task-10".

```
      <configMoChangeEvent
      cookie=""
      commCookie=""
      srcExtSys="0.0.0.0"
      destExtSys="0.0.0.0"
      srcSvc="resource-mgr_dme"
      destSvc="sam_extXMLApi"
      inEid="1104">
        <inConfig>
        <operationTask
        description="Instantiating Cloud Vm with CPM(FSM-
    STAGE:sam:dme:HcloudVmCreateVm:InstantiateCloudVm)"
        dn="operationEp/task-10"
        finishedTime="1970-01-01T00:00:00.000"
        id="10"
        message=""
        moRef="hcloud-root/vpc-VPc1/vm-TestVM"
        name="Create Vm :TestVM"
        opState="running"
        operationType="unknown"
        requestTime="2013-09-26T04:13:09.129"
        startTime="2013-09-26T04:13:09.433"
        status="created"
        tryCount="0"/>
        </inConfig>
      </configMoChangeEvent>
```

After having the Task Mo, user must subscribe to the event on Task Mo. When the Task is done, the user will get a completed response from Prime Network Services Controller.

InterCloud VM Status Monitoring

To monitor InterCloud VM status, the API user needs to set the collectStats attribute to “Yes” on the hcloudVmStatsCollection Mo.

```
  <configConfMos
  cookie="<real_cookie>"
  commCookie="5/12/0/a0"
  srcExtSys="172.25.97.162"
  destExtSys="172.25.97.162"
  srcSvc="sam_extXMLApi"
  destSvc="resource-mgr_dme"
  inHierarchical="no">
    <inConfigs>
  <pair key="hcloud-root/vpc-VPc1/icl-Cne1/vm-stats-coll">
    <hcloudVmStatsCollection
    collectStats="yes"
    dn="hcloud-root/vpc-VPc1/icl-Cne1/vm-stats-coll"
    status="modified"/>
  </pair>
    </inConfigs>
  </configConfMos>
```

After this API request, Prime Network Services Controller immediately replies with the following API response:

```
 <configConfMos
  cookie="<real_cookie>"
  commCookie="5/12/0/a0"
  srcExtSys="172.25.97.162"
  destExtSys="172.25.97.162"
  srcSvc="sam_extXMLApi"
  destSvc="resource-mgr_dme"
  response="yes"
  errorCode="0"
  errorDescr="">
    <outConfigs>
  <pair key="hcloud-root/vpc-VPc1/icl-Cne1/vm-stats-coll">
    <hcloudVmStatsCollection
    collectStats="yes"
    dn="hcloud-root/vpc-VPc1/icl-Cne1/vm-stats-coll"
    lastStatsRequest="1970-01-01T00:00:00.000"
    status="modified"
    throttleIntervalInSeconds="00:00:00:15"/>
  </pair>
    </outConfigs>
  </configConfMos>
```

After receiving an immediate response from Prime Network Services Controller, the API user must subscribe to events on the following Mos to get VM status: monitorInterfaceStatistics, monitorComputeResourceStatistics.

```
 <configMoChangeEvent
  cookie=""
  commCookie=""
  srcExtSys="0.0.0.0"
  destExtSys="0.0.0.0"
  srcSvc="resource-mgr_dme"
  destSvc="sam_extXMLApi"
  inEid="1332">
    <inConfig>
    <monitorInterfaceStatistics
    dn="hcloud-root/vpc-VPc1/icl-Cne1/ics-ics/vm-status-TestVM/tun-status-
 f454a5ef-dc78-6d2e-9821-8fabdcab4a92/intf-stats"
    rxBytes="0"
    rxErrors="0"
    rxPackets="12"
    status="created"
    timeStamp="2013-09-26T12:12:40.595"
    txBytes="0"
    txErrors="0"
    txPackets="3"/>
    </inConfig>
  </configMoChangeEvent>

 <configMoChangeEvent
  cookie=""
  commCookie=""
  srcExtSys="0.0.0.0"
  destExtSys="0.0.0.0"
  srcSvc="resource-mgr_dme"
  destSvc="sam_extXMLApi"
  inEid="1333">
    <inConfig>
    <monitorComputeResourceStatistics
    cpuUsage="1"
    dn="hcloud-root/vpc-VPc1/icl-Cne1/ics-ics/vm-status-TestVM/compute-stats"
    memoryUsage="27"
    memoryUsageInMb="459"
    status="created"
    timeStamp="2013-09-26T12:12:44.145"/>
    </inConfig>
  </configMoChangeEvent>
```

Prime Network Services Controller XML API Methods

This section includes the following topics:

- Unsupported Methods
- Supported Methods

Unsupported Methods

Cisco does not support the following methods even though they appear in the Methods list on your Prime Network Services Controller server.

Caution: We strongly recommend that you do not use the following methods. They can cause unexpected results on your Prime Network Services Controller server.

- aaaCheckComputeAuthToken
- aaaCheckComputeExtAccess
- aaaGetComputeAuthToken
- cliviewConfMos
- configFindDependencies
- configMoChangeEvent
- fsmDebugAction
- methodVessel
- orgResolveLogicalParents
- policyEstimateImpact
- statsClearInterval
- syntheticFSObjInventory
- syntheticTestTx

Supported Methods

This section provides descriptions, request and response syntax, and usage examples for the following methods:

- aaaGetRemoteUserRoles
- aaaGetUserLocales
- aaaKeepAlive
- aaaLogin
- aaaLogout
- aaaRefresh
- configConfFiltered
- configConfMo
- configConfMoGroup
- configConfMos
- configFindDnsByClassId
- configResolveChildren
- configResolveClass
- configResolveClasses
- configResolveDn
- configResolveDns
- configResolveParent
- configScope
- eventSendHeartbeat
- eventSubscribe
- eventSubscribeApps
- faultAckFault
- faultAckFaults
- faultResolveFault
- loggingSyncOcns
- orgResolveElements
- orgResolveInScope
- poolResolveInScope

These methods are also called from the GUI console.

aaaGetRemoteUserRoles

This API method returns user privileges for the remote location.

Request Syntax

```
<xs:element name="aaaGetRemoteUserRoles" type="aaaGetRemoteUserRoles"
substitutionGroup="externalMethod"/>
    <xs:complexType name="aaaGetRemoteUserRoles" mixed="true">
```

```
      <xs:attribute name="inRemoteUserName">
         <xs:simpleType>
            <xs:restriction base="xs:string">
               <xs:pattern value="[a-zA-Z][a-zA-Z0-9_.@-]{0,31}"/>
            </xs:restriction>
         </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
   </xs:complexType>
```

Response Syntax

```
<xs:element name="aaaGetRemoteUserRoles" type="aaaGetRemoteUserRoles"
substitutionGroup="externalMethod"/>
   <xs:complexType name="aaaGetRemoteUserRoles" mixed="true">
      <xs:attribute name="outRemoteUserPriv">
      <xs:simpleType>
         <xs:restriction base="xs:string">
            <xs:pattern
value="((policy|aaa|read-only|admin|tenant|operations|res config|fault),){0,7}
(policy|aaa|read-only|admin|tenant|operations|res-config|fault){0,1}"/>
               </xs:restriction>
            </xs:simpleType>
            </xs:attribute>
            <xs:attribute name="cookie" type="xs:string"/>
            <xs:attribute name="response" type="YesOrNo"/>
            <xs:attribute name="errorCode" type="xs:unsignedInt"/>
            <xs:attribute name="errorDescr" type="xs:string"/>
            <xs:attribute name="invocationResult" type="xs:string"/>
         </xs:complexType>
```

Example

Request

```
<aaaGetRemoteUserRoles
   cookie="<real_cookie>"
   inRemoteUserName="adminuser"
   outRemoteUserPriv/>
```

Response

```
<aaaGetRemoteUserRoles
   cookie="<real_cookie>"
   commCookie="11/15/0/2964"
   srcExtSys="10.193.33.109"
   destExtSys="10.193.33.109"
   srcSvc="sam_extXMLApi"
   destSvc="mgmt-controller_dme"
   response="yes"
   outRemoteUserPriv="admin">
</aaaGetRemoteUserRoles>
```

aaaGetUserLocales

This API method returns a list of authorized user locales.

Request Syntax

```
<xs:element name="aaaGetUserLocales" type="aaaGetUserLocales"
substitutionGroup="externalMethod"/>
```

```
   <xs:complexType name="aaaGetUserLocales" mixed="true">
      <xs:attribute name="inUserName">
         <xs:simpleType>
            <xs:restriction base="xs:string">
               <xs:pattern value="[a-zA-Z][a-zA-Z0-9_.@-]{0,31}"/>
            </xs:restriction>
         </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="inIsUserRemote">
         <xs:simpleType>
            <xs:union memberTypes="xs:boolean">
               <xs:simpleType>
                  <xs:restriction base="xs:string">
                     <xs:enumeration value="no"/>
                     <xs:enumeration value="yes"/>
                  </xs:restriction>
               </xs:simpleType>
            </xs:union>
         </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
   </xs:complexType>
```

Response Syntax

```
<xs:element name="aaaGetUserLocales" type="aaaGetUserLocales"
substitutionGroup="externalMethod"/>
   <xs:complexType name="aaaGetUserLocales" mixed="true">
      <xs:attribute name="outUserLocales">
         <xs:simpleType>
            <xs:restriction base="xs:string">
               <xs:minLength value="0"/>
               <xs:maxLength value="512"/>
            </xs:restriction>
         </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="errorCode" type="xs:unsignedInt"/>
      <xs:attribute name="errorDescr" type="xs:string"/>
      <xs:attribute name="invocationResult" type="xs:string"/>
   </xs:complexType>
```

Example

Request

```
<aaaGetUserLocales
   cookie="<real_cookie>"
   inUserName="john"
   inIsUserRemote="no"
   outUserLocales/>
```

Response

```
<aaaGetUserLocales
   cookie="<real_cookie>"
   commCookie="11/15/0/2962"
   srcExtSys="10.193.33.109"
```

```
    destExtSys="10.193.33.109"
    srcSvc="sam_extXMLApi"
    destSvc="mgmt-controller_dme"
    response="yes"
    outUserLocales="TestSanity">
</aaaGetUserLocales>
```

aaaKeepAlive

The following example keeps the session active until the default session time expires and uses the same cookie after the method call.

Request Syntax

```
<xs:element name="aaaKeepAlive" type="aaaKeepAlive"
substitutionGroup="externalMethod"/>
    <xs:complexType name="aaaKeepAlive" mixed="true">
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
</xs:complexType>
```

Response Syntax

```
<xs:element name="aaaKeepAlive" type="aaaKeepAlive"
substitutionGroup="externalMethod"/>
    <xs:complexType name="aaaKeepAlive" mixed="true">
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
        <xs:attribute name="errorCode" type="xs:unsignedInt"/>
        <xs:attribute name="errorDescr" type="xs:string"/>
        <xs:attribute name="invocationResult" type="xs:string"/>
    </xs:complexType>
```

Example

Request

```
<aaaKeepAlive
    cookie="<real_cookie>" />
```

Response

```
<aaaKeepAlive
    cookie="<real_cookie>"
    commCookie="11/15/0/2969"
    srcExtSys="10.193.33.109"
    destExtSys="10.193.33.109"
    srcSvc="sam_extXMLApi"
    destSvc="mgmt-controller_dme"
    response="yes">
</aaaKeepAlive>
```

aaaLogin

The following example shows the login process that is required to begin a session and which establishes an authenticated HTTPS session between the client and Prime Network Services Controller.

Request Syntax

```
<xs:element name="aaaLogin" type="aaaLogin" substitutionGroup="externalMethod"/>
    <xs:complexType name="aaaLogin" mixed="true">
        <xs:attribute name="inName">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:pattern value="[\-\.:_a-zA-Z0-9]{0,16}"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:attribute>
        <xs:attribute name="inPassword">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:minLength value="0"/>
                    <xs:maxLength value="512"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:attribute>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
    </xs:complexType>
```

Response Syntax

```
<xs:element name="aaaLogin" type="aaaLogin" substitutionGroup="externalMethod"/>
    <xs:complexType name="aaaLogin" mixed="true">
        <xs:attribute name="outCookie" type="xs:string"/>
        <xs:attribute name="outRefreshPeriod" type="xs:unsignedInt"/>
        <xs:attribute name="outPriv">
        <xs:simpleType>
            <xs:restriction base="xs:string">
                <xs:pattern
value="((policy|aaa|read-only|admin|tenant|operations|res
config|fault),){0,7}(policy|aaa|read-only|admin|tenant|operations|res-
config|fault){0,1}"/>
            </xs:restriction>
        </xs:simpleType>
        </xs:attribute>
        <xs:attribute name="outDomains" type="xs:string"/>
        <xs:attribute name="outChannel">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:enumeration value="fullssl"/>
                    <xs:enumeration value="noencssl"/>
                    <xs:enumeration value="plain"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:attribute>
        <xs:attribute name="outEvtChannel">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:enumeration value="fullssl"/>
                    <xs:enumeration value="noencssl"/>
                    <xs:enumeration value="plain"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:attribute>
        <xs:attribute name="outSessionId">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:minLength value="1"/>
                    <xs:maxLength value="64"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:attribute>
        <xs:attribute name="outVersion" type="xs:string"/>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
        <xs:attribute name="errorCode" type="xs:unsignedInt"/>
        <xs:attribute name="errorDescr" type="xs:string"/>
        <xs:attribute name="invocationResult" type="xs:string"/>
    </xs:complexType>
```

Example

Request

```
<aaaLogin
    inName="admin"
    inPassword="Nbv12345"/>
```

Response

```
<aaaLogin cookie=""
    commCookie=""
    srcExtSys="0.0.0.0"
    destExtSys="0.0.0.0"
    srcSvc="" destSvc=""
    response="yes"
    outCookie="<real_cookie>"
    outRefreshPeriod="600"
    outPriv="admin"
    outDomains=""
    outChannel="fullssl"
    outEvtChannel="fullssl"
    outSessionId="web_49019"
    outVersion="1.0(0.39938)">
</aaaLogin>
```

aaaLogout

The following example shows the logout process to end a current session. When the default session time period expires, the process is called automatically.

Request Syntax

```
<xs:element name="aaaLogout" type="aaaLogout" substitutionGroup="externalMethod"/>
    <xs:complexType name="aaaLogout" mixed="true">
        <xs:attribute name="inCookie" type="xs:string"/>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
    </xs:complexType>
```

Response Syntax

```
<xs:element name="aaaLogout" type="aaaLogout" substitutionGroup="externalMethod"/>
    <xs:complexType name="aaaLogout" mixed="true">
        <xs:attribute name="outStatus">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:enumeration value="success"/>
                    <xs:enumeration value="failure"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:attribute>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
        <xs:attribute name="errorCode" type="xs:unsignedInt"/>
        <xs:attribute name="errorDescr" type="xs:string"/>
        <xs:attribute name="invocationResult" type="xs:string"/>
    </xs:complexType>
```

Example

Request

```
<aaaLogout
    inCookie="<real_cookie>"
    outStatus/>
```

Response

```
<aaaLogout cookie=""
    commCookie=""
    srcExtSys="0.0.0.0"
    destExtSys="0.0.0.0"
    srcSvc=""
    destSvc=""
    response="yes"
    outStatus="success">
</aaaLogout>
```

aaaRefresh

Sessions can be kept active (within the default session time frame) by user activity. There is a default of 7200 seconds that counts down when inactivity begins. If the 7200 seconds expire, Prime Network Services Controller enters a sleep mode and requires signing back in, which restarts the countdown. The session continues using the same session ID.

Note Using this method expires the previous cookie and issues a new cookie.

Request Syntax

```
<xs:element name="aaaRefresh" type="aaaRefresh" substitutionGroup="externalMethod"/>
    <xs:complexType name="aaaRefresh" mixed="true">
        <xs:attribute name="inName">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:pattern value="[\-\.:_a-zA-Z0-9]{0,16}"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:attribute>
        <xs:attribute name="inPassword">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:minLength value="0"/>
                    <xs:maxLength value="512"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:attribute>
        <xs:attribute name="inCookie" type="xs:string"/>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
    </xs:complexType>
```

Response Syntax

```
<xs:element name="aaaRefresh" type="aaaRefresh" substitutionGroup="externalMethod"/>
   <xs:complexType name="aaaRefresh" mixed="true">
      <xs:attribute name="outCookie" type="xs:string"/>
      <xs:attribute name="outRefreshPeriod" type="xs:unsignedInt"/>
      <xs:attribute name="outPriv">
      <xs:simpleType>
         <xs:restriction base="xs:string">
            <xs:pattern
value="((policy|aaa|read-only|admin|tenant|operations|res-
config|fault),){0,7}(policy|aaa|
read-only|admin|tenant|operations|res-config|fault){0,1}"/>
         </xs:restriction>
      </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="outDomains" type="xs:string"/>
      <xs:attribute name="outChannel">
         <xs:simpleType>
            <xs:restriction base="xs:string">
               <xs:enumeration value="fullssl"/>
               <xs:enumeration value="noencssl"/>
               <xs:enumeration value="plain"/>
            </xs:restriction>
         </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="outEvtChannel">
         <xs:simpleType>
            <xs:restriction base="xs:string">
               <xs:enumeration value="fullssl"/>
               <xs:enumeration value="noencssl"/>
               <xs:enumeration value="plain"/>
            </xs:restriction>
         </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="errorCode" type="xs:unsignedInt"/>
      <xs:attribute name="errorDescr" type="xs:string"/>
      <xs:attribute name="invocationResult" type="xs:string"/>
   </xs:complexType>
```

Example

Request

```
<aaaRefresh
   cookie="<real_cookie>"
   inName="admin"
   inPassword="Nbv12345"
   inCookie="<real_cookie>"/>
```

Response

```
<aaaRefresh
   cookie="<real_cookie>"
   commCookie="" srcExtSys="0.0.0.0"
   destExtSys="0.0.0.0"
   srcSvc=""
   destSvc=""
   response="yes"
```

```
    outCookie="<real_cookie>"
    outRefreshPeriod="600"
    outPriv="admin"
    outDomains=""
    outChannel="fullssl"
    outEvtChannel="fullssl">
</aaaRefresh>
```

configConfFiltered

The following example shows how data and activity are limited according to the configured policies.

Request Syntax

```
<xs:element name="configConfFiltered" type="configConfFiltered"
substitutionGroup="externalMethod"/>
    <xs:complexType name="configConfFiltered" mixed="true">
        <xs:all>
            <xs:element name="inFilter" type="filterFilter" minOccurs="0"/>
            <xs:element name="inConfig" type="configConfig" minOccurs="0"/>
        </xs:all>
        <xs:attribute name="inHierarchical">
            <xs:simpleType>
                <xs:union memberTypes="xs:boolean">
                    <xs:simpleType>
                        <xs:restriction base="xs:string">
                            <xs:enumeration value="no"/>
                            <xs:enumeration value="yes"/>
                        </xs:restriction>
                    </xs:simpleType>
                </xs:union>
            </xs:simpleType>
        </xs:attribute>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
        <xs:attribute name="classId" type="namingClassId"/>
    </xs:complexType>
```

Response Syntax

```
<xs:element name="configConfFiltered" type="configConfFiltered"
substitutionGroup="externalMethod"/>
    <xs:complexType name="configConfFiltered" mixed="true">
        <xs:all>
            <xs:element name="outConfigs" type="configSet" minOccurs="0"/>
        </xs:all>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
        <xs:attribute name="errorCode" type="xs:unsignedInt"/>
        <xs:attribute name="errorDescr" type="xs:string"/>
        <xs:attribute name="invocationResult" type="xs:string"/>
        <xs:attribute name="classId" type="namingClassId"/>
    </xs:complexType>
```

Example

Request

```
<configConfFiltered
    cookie="<real_cookie>"
    inHierarchical="false"
    classId="orgTenant">
    <inFilter>
        <eq class="orgTenant"
            property="name"
            value="Tenant1" />
    </inFilter>
    <inConfig>
        <orgDatacenter
            dn="org-HR"
            descr="HR (Human Resources- new Descr)"/>
    </inConfig>
</configConfFiltered>
```

Response

```
<configConfFiltered
    cookie="<real_cookie>"
    commCookie="5/15/0/617"
    srcExtSys="10.193.33.206"
    destExtSys="10.193.33.206"
    srcSvc="sam_extXMLApi"
    destSvc="resource-mgr_dme"
    response="yes"
    classId="orgTenant">
    <outConfigs>
        <orgDatacenter
            descr="HR (Human Resources- new Descr)"
            dn="org-root/org-tenant1/org-HR"
            fltAggr="0"
            level="2"
            name="HR"
            status="modified"/>
    </outConfigs>
</configConfFiltered>
```

configConfMo

The following example shows how the specified Managed Object is configured in a single subtree (for example, DN).

Request Syntax

```
<xs:element name="configConfMo" type="configConfMo"
substitutionGroup="externalMethod"/>
    <xs:complexType name="configConfMo" mixed="true">
        <xs:all>
            <xs:element name="inConfig" type="configConfig" minOccurs="0"/>
        </xs:all>
        <xs:attribute name="inHierarchical">
            <xs:simpleType>
                <xs:union memberTypes="xs:boolean">
                    <xs:simpleType>
                        <xs:restriction base="xs:string">
                            <xs:enumeration value="no"/>
                            <xs:enumeration value="yes"/>
                        </xs:restriction>
                    </xs:simpleType>
                </xs:union>
            </xs:simpleType>
        </xs:attribute>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
        <xs:attribute name="dn" type="referenceObject"/>
    </xs:complexType>
```

Response Syntax

```
<xs:element name="configConfMo" type="configConfMo"
substitutionGroup="externalMethod"/>
    <xs:complexType name="configConfMo" mixed="true">
        <xs:all>
            <xs:element name="outConfig" type="configConfig" minOccurs="0"/>
        </xs:all>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
        <xs:attribute name="errorCode" type="xs:unsignedInt"/>
        <xs:attribute name="errorDescr" type="xs:string"/>
        <xs:attribute name="invocationResult" type="xs:string"/>
        <xs:attribute name="dn" type="referenceObject"/>
    </xs:complexType>
```

Example

Request

```
<configConfMo
    dn=""
    cookie="<real_cookie>"
    inHierarchical="false">
    <inConfig>
        <aaaLdapEp
            attribute="CiscoAvPair"
            basedn="dc=pasadena,dc=company123,dc=com"
            descr=""
            dn="sys/ldap-ext"
            filter="sAMAccountName=$userid"
            retries="1"
            status="modified"
            timeout="30"/>
    </inConfig>
</configConfMo>
```

Response

```
<configConfMo
    dn=""
    cookie="<real_cookie>"
    commCookie="11/15/0/28"
    srcExtSys="10.193.33.101"
    destExtSys="10.193.33.101"
    destSvc="mgmt-controller_dme"
    response="yes">
    <outConfig>
        <aaaLdapEp
            attribute="CiscoAvPair"
            basedn="dc=pasadena,dc=company123,dc=com"
            childAction="deleteNonPresent"
            descr=""
            dn="sys/ldap-ext"
            filter="sAMAccountName=$userid"
            fsmDescr=""
            fsmPrev="updateEpSuccess"
            fsmProgr="100"
            fsmStageDescr=""
            fsmStamp="2010-11-22T23:41:01.826"
            fsmStatus="nop"
            fsmTry="0"
            intId="10027"
            name=""
            retries="1"
            status="modified"
            timeout="30"/>
    </outConfig>
</configConfMo>
```

configConfMoGroup

The following example shows how groups of managed objects are configured based upon the configured policies.

Request Syntax

```
<xs:element name="configConfMoGroup" type="configConfMoGroup"
substitutionGroup="externalMethod"/>
    <xs:complexType name="configConfMoGroup" mixed="true">
        <xs:all>
            <xs:element name="inDns" type="dnSet" minOccurs="0"/>
            <xs:element name="inConfig" type="configConfig" minOccurs="0"/>
        </xs:all>
        <xs:attribute name="inHierarchical">
            <xs:simpleType>
                <xs:union memberTypes="xs:boolean">
                    <xs:simpleType>
                        <xs:restriction base="xs:string">
                            <xs:enumeration value="no"/>
                            <xs:enumeration value="yes"/>
                        </xs:restriction>
                    </xs:simpleType>
                </xs:union>
            </xs:simpleType>
        </xs:attribute>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
    </xs:complexType>
```

Response Syntax

```
<xs:element name="configConfMoGroup" type="configConfMoGroup"
substitutionGroup="externalMethod"/>
    <xs:complexType name="configConfMoGroup" mixed="true">
        <xs:all>
            <xs:element name="outConfigs" type="configSet" minOccurs="0"/>
        </xs:all>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
        <xs:attribute name="errorCode" type="xs:unsignedInt"/>
        <xs:attribute name="errorDescr" type="xs:string"/>
        <xs:attribute name="invocationResult" type="xs:string"/>
    </xs:complexType>
```

Example

Note The descr property of orgDataCenter (under org-root/org-tenant1 and org-root/org-tenant2) is modified. Because the descr property is not implicit, it can be modified. If implicit, the modification does not apply and a new orgDataCenter is created.

The descr property of orgDataCenter (under org-root/org-tenant1 and org-root/org-tenant2) is modified. Because the descr property is not implicit, it can be modified. If implicit, the modification does not apply and a new orgDataCenter is created.

Request

```
<configConfMoGroup
   cookie="<real_cookie>"
   inHierarchical="false">
   <inDns>
      <dn value="org-root/org-tenant1" />
      <dn value="org-root/org-tenant2" />
   </inDns>
   <inConfig>
      <orgDatacenter
         dn="org-HR"
         descr="HR (Human Resources)"/>
   </inConfig>
</configConfMoGroup>
```

Response

```
<configConfMoGroup
   cookie="<real_cookie>"
   commCookie="5/15/0/600"
   srcExtSys="10.193.33.206"
   destExtSys="10.193.33.206"
   srcSvc="sam_extXMLApi"
   destSvc="resource-mgr_dme"
   response="yes">
   <outConfigs>
      <orgDatacenter
         descr="HR (Human Resources)"
         dn="org-root/org-Cola/org-HR"
         fltAggr="0"
         level="2"
         name="HR"
         status="modified"/>
      <orgDatacenter
         descr="HR (Human Resources)"
         dn="org-root/org-tenant1/org-HR"
         fltAggr="0"
         level="2"
         name="HR"
         status="modified"/>
   </outConfigs>
</configConfMoGroup>
```

configConfMos

The following example shows how to configure managed objects in multiple subtrees using DNs.

Request Syntax

```
<xs:element name="configConfMos" type="configConfMos"
substitutionGroup="externalMethod"/>
   <xs:complexType name="configConfMos" mixed="true">
```

```
      <xs:all>
         <xs:element name="inConfigs" type="configMap" minOccurs="0">
            <xs:unique name="unique_map_key_2">
               <xs:selector xpath="pair"/>
               <xs:field xpath="@key"/>
            </xs:unique>
         </xs:element>
      </xs:all>
      <xs:attribute name="inHierarchical">
         <xs:simpleType>
            <xs:union memberTypes="xs:boolean">
               <xs:simpleType>
                  <xs:restriction base="xs:string">
                     <xs:enumeration value="no"/>
                     <xs:enumeration value="yes"/>
                  </xs:restriction>
               </xs:simpleType>
            </xs:union>
         </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
   </xs:complexType>
```

Response Syntax

```
<xs:element name="configConfMos" type="configConfMos"
substitutionGroup="externalMethod"/>
   <xs:complexType name="configConfMos" mixed="true">
      <xs:all>
         <xs:element name="outConfigs" type="configMap" minOccurs="0">
            <xs:unique name="unique_map_key_4">
               <xs:selector xpath="pair"/>
               <xs:field xpath="@key"/>
            </xs:unique>
         </xs:element>
      </xs:all>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="errorCode" type="xs:unsignedInt"/>
      <xs:attribute name="errorDescr" type="xs:string"/>
      <xs:attribute name="invocationResult" type="xs:string"/>
   </xs:complexType>
```

Example

Request

```
<configConfMos
   cookie="<real_cookie>">
   <inConfigs>
      <pair key="org-root/logprof-default">
         <policyLogProfile dn="org-root/logprof-default"
            name="default"
            level="debug1"
            size="10000000"
            backupCount="4"/>
      </pair>
```

```
<!-- Update Controller Device Profile -->
       <pair key="org-root/controller-profile-default">
          <policyControllerDeviceProfile
             dn="org-root/controller-profile-default"
             adminState="enabled">
             <commDnsProvider hostip="171.70.168.183" order="1"/>
             <commDnsProvider hostip="171.68.226.120" order="2"/>
             <commDnsProvider hostip="64.102.6.247" order="3"/>
          </policyControllerDeviceProfile>
       </pair>
   </inConfigs>
</configConfMos>
```

Response

```
<configConfMos
   cookie="<real_cookie>"
   commCookie="7/15/0/1a74"
   srcExtSys="10.193.34.70"
   destExtSys="10.193.34.70"
   srcSvc="sam_extXMLApi"
   destSvc="policy-mgr_dme"
   response="yes">
   <outConfigs>
      <pair key="org-root/logprof-default">
         <policyLogProfile
            backupCount="4"
            descr="the log level for every process"
            dn="org-root/logprof-default"
            intId="10065"
            level="debug1"
            name="default"
            size="10000000"/>
      </pair>
      <pair key="org-root/controller-profile-default">
         <policyControllerDeviceProfile
            adminState="enabled"
            coreFilePolicy=""
            descr="default profile for management server virtual machine"
            dn="org-root/controller-profile-default"
            dnsPolicy=""
            faultPolicy="default"
            httpPolicy="default"
            httpsPolicy="default"
            intId="10057"
            logProfilePolicy="default"
            name="default"
            snmpPolicy=""
            syslogPolicy=""
            telnetPolicy=""
            timezone=""/>
      </pair>
   </outConfigs>
</configConfMos>
```

configFindDnsByClassId

The following example shows how to find distinguished names and return them sorted by class ID.

Request Syntax

```
<xs:element name="configFindDnsByClassId" type="configFindDnsByClassId"
```

```
substitutionGroup="externalMethod"/>
   <xs:complexType name="configFindDnsByClassId" mixed="true">
      <xs:all>
         <xs:element name="inFilter" type="filterFilter" minOccurs="0"/>
      </xs:all>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="classId" type="namingClassId"/>
   </xs:complexType>
```

Response Syntax

```
<xs:element name="configFindDnsByClassId" type="configFindDnsByClassId"
substitutionGroup="externalMethod"/>
   <xs:complexType name="configFindDnsByClassId" mixed="true">
      <xs:all>
         <xs:element name="outDns" type="dnSet" minOccurs="0"/>
      </xs:all>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="errorCode" type="xs:unsignedInt"/>
      <xs:attribute name="errorDescr" type="xs:string"/>
      <xs:attribute name="invocationResult" type="xs:string"/>
      <xs:attribute name="classId" type="namingClassId"/>
   </xs:complexType>
```

Example

Request

```
<configFindDnsByClassId
   classId="eventRecord"
   cookie="<real_cookie>" />
```

Response

```
<configFindDnsByClassId
   cookie="<real_cookie>"
   commCookie="2/12/0/1810"
   srcExtSys="172.20.101.150"
   destExtSys="172.20.101.150"
   srcSvc="sam_extXMLApi"
   destSvc="service-reg_dme"
   response="yes"
   classId="eventRecord">
   <outDns>
      <dn value="event-log/10210"/>
      <dn value="event-log/10250"/>
      <dn value="event-log/10211"/>
      <dn value="event-log/10221"/>
      <dn value="event-log/10251"/>
      <dn value="event-log/10141"/>
      <dn value="event-log/10151"/>
   </outDns>
</configFindDnsByClassId>
```

configResolveChildren

The following example shows how to retrieve children of managed objects under a specific DN in the managed information tree. A filter can be used to reduce the number of children being returned.

Request Syntax

```
<xs:element name="configResolveChildren" type="configResolveChildren"
substitutionGroup="externalMethod"/>
   <xs:complexType name="configResolveChildren" mixed="true">
      <xs:all>
         <xs:element name="inFilter" type="filterFilter" minOccurs="0"/>
      </xs:all>
      <xs:attribute name="inDn" type="referenceObject"/>
      <xs:attribute name="inHierarchical">
         <xs:simpleType>
            <xs:union memberTypes="xs:boolean">
               <xs:simpleType>
                  <xs:restriction base="xs:string">
                     <xs:enumeration value="no"/>
                     <xs:enumeration value="yes"/>
                  </xs:restriction>
               </xs:simpleType>
            </xs:union>
         </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="classId" type="namingClassId"/>
   </xs:complexType>
```

Response Syntax

```
<xs:element name="configResolveChildren" type="configResolveChildren"
substitutionGroup="externalMethod"/>
   <xs:complexType name="configResolveChildren" mixed="true">
      <xs:all>
         <xs:element name="outConfigs" type="configSet" minOccurs="0"/>
      </xs:all>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="errorCode" type="xs:unsignedInt"/>
      <xs:attribute name="errorDescr" type="xs:string"/>
      <xs:attribute name="invocationResult" type="xs:string"/>
      <xs:attribute name="classId" type="namingClassId"/>
   </xs:complexType>
```

Example

Request

```
<configResolveChildren
   cookie="<real_cookie>"
   classId="aaaUser"
   inDn="sys/user-ext"
   inHierarchical="false">
   <inFilter>
   </inFilter>
</configResolveChildren>
```

Response

```
<configResolveChildren
   cookie="<real_cookie>"
   commCookie="11/15/0/2a59"
   srcExtSys="10.193.33.120"
```

```
    destExtSys="10.193.33.120"
    srcSvc="sam_extXMLApi"
    destSvc="mgmt-controller_dme"
    response="yes"
    classId="aaaUser">
    <outConfigs>
        <aaaUser descr="" dn="sys/user-ext/user-doe"
            email="" expiration="never" expires="no" firstName="John" intId="12999"
            lastName="Doe" name="doe" phone="" priv="admin,read-only" pwdSet="yes"/>
        <aaaUser descr="" dn="sys/user-ext/user-jacks" email="" expiration="never"
            expires="no" firstName="Play" intId="12734" lastName="Jacks" name="jacks"
            phone="" priv="fault,operations,policy,read-only,res-config,tenant"
            pwdSet="yes"/>
        <aaaUser descr="" dn="sys/user-ext/user-admin" email="" expiration="never"
            expires="no" firstName="" intId="10052" lastName="" name="admin" phone=""
            priv="admin,read-only" pwdSet="yes"/>
        <aaaUser descr="" dn="sys/user-ext/user-over" email="" expiration="never"
            expires="no" firstName="Roll" intId="12711" lastName="Over" name="over"
            phone="" priv="fault,operations,policy,read-only,res-config,tenant"
            pwdSet="yes"/>
        <aaaUser descr="" dn="sys/user-ext/user-fun" email="" expiration="never"
            expires="no" firstName="Have" intId="12708" lastName="Fun" name="fun"
            phone=""
            priv="read-only" pwdSet="yes"/>
        <aaaUser descr="testuser" dn="sys/user-ext/user-aaa" email=""
        expiration="never"
            expires="no" firstName="a" intId="10620" lastName="aa" name="aaa" phone=""
            priv="aaa,read-only" pwdSet="no"/>
    </outConfigs>
</configResolveChildren>
```

configResolveClass

The following example shows how to return the requested managed object in a given class. If inHierarchical = true, the returned object will also contain its children.

Request Syntax

```
<xs:element name="configResolveClass" type="configResolveClass"
substitutionGroup="externalMethod"/>
    <xs:complexType name="configResolveClass" mixed="true">
        <xs:all>
            <xs:element name="inFilter" type="filterFilter" minOccurs="0"/>
        </xs:all>
        <xs:attribute name="inHierarchical">
            <xs:simpleType>
                <xs:union memberTypes="xs:boolean">
                    <xs:simpleType>
                        <xs:restriction base="xs:string">
                            <xs:enumeration value="no"/>
                            <xs:enumeration value="yes"/>
                        </xs:restriction>
                    </xs:simpleType>
                </xs:union>
            </xs:simpleType>
        </xs:attribute>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
        <xs:attribute name="classId" type="namingClassId"/>
    </xs:complexType>
```

Response Syntax

```
<xs:element name="configResolveClass" type="configResolveClass"
substitutionGroup="externalMethod"/>
    <xs:complexType name="configResolveClass" mixed="true">
        <xs:all>
            <xs:element name="outConfigs" type="configSet" minOccurs="0"/>
        </xs:all>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
        <xs:attribute name="errorCode" type="xs:unsignedInt"/>
        <xs:attribute name="errorDescr" type="xs:string"/>
        <xs:attribute name="invocationResult" type="xs:string"/>
        <xs:attribute name="classId" type="namingClassId"/>
    </xs:complexType>
```

Example

Request

```
<configResolveClass
    cookie="<real_cookie>"
    classId="pkiEp"
    inHierarchical="false">
    <inFilter>
    </inFilter>
</configResolveClass>
```

Response

```
<configResolveClass
    cookie="<real_cookie>"
    commCookie="11/15/0/2a5b"
    srcExtSys="10.193.33.120"
    destExtSys="10.193.33.120"
    srcSvc="sam_extXMLApi"
    destSvc="mgmt-controller_dme"
    response="yes"
    classId="pkiEp">
    <outConfigs>
        <pkiEp descr=""
            dn="sys/pki-ext"
            intId="10037"
            name=""/>
    </outConfigs>
</configResolveClass>
```

configResolveClasses

The following example shows how to return requested managed objects in several classes. If inHierarchical= true, the returned object will also contain its children.

Request Syntax

```
<xs:element name="configResolveClasses" type="configResolveClasses"
substitutionGroup="externalMethod"/>
    <xs:complexType name="configResolveClasses" mixed="true">
        <xs:all>
            <xs:element name="inIds" type="classIdSet" minOccurs="0"/>
        </xs:all>
        <xs:attribute name="inHierarchical">
            <xs:simpleType>
                <xs:union memberTypes="xs:boolean">
                    <xs:simpleType>
                        <xs:restriction base="xs:string">
                            <xs:enumeration value="no"/>
                            <xs:enumeration value="yes"/>
                        </xs:restriction>
                    </xs:simpleType>
                </xs:union>
            </xs:simpleType>
        </xs:attribute>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
    </xs:complexType>
```

Response Syntax

```
<xs:element name="configResolveClasses" type="configResolveClasses"
substitutionGroup="externalMethod"/>
    <xs:complexType name="configResolveClasses" mixed="true">
        <xs:all>
            <xs:element name="outConfigs" type="configSet" minOccurs="0"/>
        </xs:all>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
        <xs:attribute name="errorCode" type="xs:unsignedInt"/>
        <xs:attribute name="errorDescr" type="xs:string"/>
        <xs:attribute name="invocationResult" type="xs:string"/>
    </xs:complexType>
```

Example

Request

```
<configResolveClasses
    cookie="<real_cookie>"
    inHierarchical="false">
    <inIds>
        <Id value="eventRecord"/>
        <Id value="faultInst"/>
    </inIds>
</configResolveClasses>
```

Response

```
<configResolveClasses
    cookie="<real_cookie>"
    commCookie="2/12/0/181a"
    srcExtSys="172.20.101.150"
    destExtSys="172.20.101.150"
    srcSvc="sam_extXMLApi"
    destSvc="service-reg_dme"
    response="yes">
    <outConfigs>
        <eventRecord
            affected="observe/observed-1001-1"
            cause="transition"
            changeSet=""
            code="E4194388"
```

```
          created="2012-07-25T00:39:35.528"
          descr="[FSM:BEGIN]: Resolve Mgmt Controller
Fsm(FSM:sam:dme:ObserveObservedResolveControllerFsm)"
          dn="event-log/10133"
          id="10133"
          ind="state-transition"
          severity="info"
          trig="special"
          txId="3"
          user="internal"/>
      <eventRecord
          affected="observe/observed-1001-1"
          cause="transition"
          changeSet=""
          code="E4194388"
          created="2012-07-25T00:39:35.528"
          descr="[FSM:STAGE:END]:
(FSM-STAGE:sam:dme:ObserveObservedResolveControllerFsm:begin)"
          dn="event-log/10134"
          id="10134"
          ind="state-transition"
          severity="info"
          trig="special"
          txId="3"
          user="internal"/>
   </outConfigs>
</configResolveClasses>
```

configResolveDn

The following example shows how to retrieve a single managed object for a specified DN.

Request Syntax

```
<xs:element name="configResolveDn" type="configResolveDn"
substitutionGroup="externalMethod"/>
   <xs:complexType name="configResolveDn" mixed="true">
      <xs:attribute name="inHierarchical">
         <xs:simpleType>
            <xs:union memberTypes="xs:boolean">
               <xs:simpleType>
                  <xs:restriction base="xs:string">
                     <xs:enumeration value="no"/>
                     <xs:enumeration value="yes"/>
                  </xs:restriction>
               </xs:simpleType>
            </xs:union>
         </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="dn" type="referenceObject"/>
   </xs:complexType>
```

Response Syntax

```
<xs:element name="configResolveDn" type="configResolveDn"
substitutionGroup="externalMethod"/>
   <xs:complexType name="configResolveDn" mixed="true">
```

```
        <xs:all>
            <xs:element name="outConfig" type="configConfig" minOccurs="0"/>
        </xs:all>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
        <xs:attribute name="errorCode" type="xs:unsignedInt"/>
        <xs:attribute name="errorDescr" type="xs:string"/>
        <xs:attribute name="invocationResult" type="xs:string"/>
        <xs:attribute name="dn" type="referenceObject"/>
    </xs:complexType>
```

Example

Request

```
<configResolveDn
    cookie="<real_cookie>"
    dn="vmmEp/vm-mgr-vcenter1" />
```

Response

```
<configResolveDn dn="vmmEp/vm-mgr-vcenter1"
    cookie="<real_cookie>"
    commCookie="9/15/0/1c0d"
    srcExtSys="10.193.34.70"
    destExtSys="10.193.34.70"
    srcSvc="sam_extXMLApi"
    destSvc="vm-mgr_dme"
    response="yes">
    <outConfig>
        <vmManager
            adminState="enable"
            descr=""
            dn="vmmEp/vm-mgr-vcenter1"
            fltAggr="0"
            fsmDescr="AG registration with
vCenter(FSM:sam:dme:VmManagerRegisterWithVCenter)"
            fsmPrev="RegisterWithVCenterRegistering"
            fsmProgr="13"
            fsmRmtInvErrCode="none"
            fsmRmtInvErrDescr=""
            fsmRmtInvRslt=""
            fsmStageDescr="AG registration with
vCenter(FSM-STAGE:sam:dme:VmManagerRegisterWithVCenter:Registering)"
            fsmStamp="2010-11-11T21:37:15.696"
            fsmStatus="RegisterWithVCenterRegistering"
            fsmTry="1"
            hostName="vpod-31.host123.com"
            intId="21959"
            name="vcenter1"
            operState="unknown"
            stateQual=""
            type="vmware"
            version=""/>
    </outConfig>
</configResolveDn>
```

configResolveDns

The following example shows how to retrieve managed objects for a list of DNs.

Request Syntax

```
<xs:element name="configResolveDns" type="configResolveDns"
```

```
substitutionGroup="externalMethod"/>
   <xs:complexType name="configResolveDns" mixed="true">
      <xs:all>
         <xs:element name="inDns" type="dnSet" minOccurs="0"/>
      </xs:all>
      <xs:attribute name="inHierarchical">
         <xs:simpleType>
            <xs:union memberTypes="xs:boolean">
               <xs:simpleType>
                  <xs:restriction base="xs:string">
                     <xs:enumeration value="no"/>
                     <xs:enumeration value="yes"/>
                  </xs:restriction>
               </xs:simpleType>
            </xs:union>
         </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
   </xs:complexType>
```

Response Syntax

```
<xs:element name="configResolveDns" type="configResolveDns"
substitutionGroup="externalMethod"/>
   <xs:complexType name="configResolveDns" mixed="true">
      <xs:all>
         <xs:element name="outConfigs" type="configSet" minOccurs="0"/>
         <xs:element name="outUnresolved" type="dnSet" minOccurs="0"/>
      </xs:all>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="errorCode" type="xs:unsignedInt"/>
      <xs:attribute name="errorDescr" type="xs:string"/>
      <xs:attribute name="invocationResult" type="xs:string"/>
   </xs:complexType>
```

Example

Request

```
<configResolveDns
   cookie="<real_cookie>"
   inHierarchical="false">
   <inDns>
      <dn value="sys" />
   </inDns>
   </configResolveDns>
```

Response

```
<configResolveDns
   cookie="<real_cookie>"
   commCookie="5/12/0/1009"
   srcExtSys="172.25.103.136"
   destExtSys="172.25.103.136"
   srcSvc="sam_extXMLApi"
   destSvc="resource-mgr_dme"
   response="yes">
   <outConfigs>
```

```
      <topSystem
         address="172.25.103.136"
         currentTime="2012-08-01T00:47:44.663"
         dn="sys"
         mode="stand-alone"
         name="localhost"
         systemOrg=""
         systemUpTime="04:04:05:00"/>
   </outConfigs>
   <outUnresolved>
   </outUnresolved>
</configResolveDns>
```

configResolveParent

The following example shows how to retrieve the parent of the managed object for a specified DN.

Request Syntax

```
<xs:element name="configResolveParent" type="configResolveParent"
substitutionGroup="externalMethod"/>
   <xs:complexType name="configResolveParent" mixed="true">
      <xs:attribute name="inHierarchical">
         <xs:simpleType>
            <xs:union memberTypes="xs:boolean">
               <xs:simpleType>
                  <xs:restriction base="xs:string">
                     <xs:enumeration value="no"/>
                     <xs:enumeration value="yes"/>
                  </xs:restriction>
               </xs:simpleType>
            </xs:union>
         </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="dn" type="referenceObject"/>
   </xs:complexType>
```

Response Syntax

```
<xs:element name="configResolveParent" type="configResolveParent"
substitutionGroup="externalMethod"/>
   <xs:complexType name="configResolveParent" mixed="true">
      <xs:all>
         <xs:element name="outConfig" type="configConfig" minOccurs="0"/>
      </xs:all>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="errorCode" type="xs:unsignedInt"/>
      <xs:attribute name="errorDescr" type="xs:string"/>
      <xs:attribute name="invocationResult" type="xs:string"/>
      <xs:attribute name="dn" type="referenceObject"/>
   </xs:complexType>
```

Example

Request

```
<configResolveParent
```

```
   cookie="<real_cookie>"
   inHierarchical="false"
   dn="org-root/org-tenant1/org-HR">
</configResolveParent>
```

Response

```
<configResolveParent
   dn="org-root/org-tenant/org-HR"
   cookie="<real_cookie>"
   commCookie="2/12/0/1837"
   srcExtSys="172.20.101.150"
   destExtSys="172.20.101.150"
   srcSvc="sam_extXMLApi"
   destSvc="service-reg_dme"
   response="yes">
      <outConfig>
      <orgTenant
      descr="tenant123"
      dn="org-root/org-tenant"
      fltAggr="0"
      level="1"
      name="tenant123"/>
   </outConfig>
</configResolveParent>
```

configScope

The following example shows how to return managed objects and details about their configuration.

Request Syntax

```
<xs:element name="configScope" type="configScope"
substitutionGroup="externalMethod"/>
   <xs:complexType name="configScope" mixed="true">
      <xs:all>
         <xs:element name="inFilter" type="filterFilter" minOccurs="0"/>
      </xs:all>
      <xs:attribute name="inClass" type="namingClassId"/>
      <xs:attribute name="inHierarchical">
         <xs:simpleType>
            <xs:union memberTypes="xs:boolean">
               <xs:simpleType>
                  <xs:restriction base="xs:string">
                     <xs:enumeration value="no"/>
                     <xs:enumeration value="yes"/>
                  </xs:restriction>
               </xs:simpleType>
            </xs:union>
         </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="inRecursive">
         <xs:simpleType>
            <xs:union memberTypes="xs:boolean">
               <xs:simpleType>
                  <xs:restriction base="xs:string">
                     <xs:enumeration value="no"/>
                     <xs:enumeration value="yes"/>
                  </xs:restriction>
```

```
                </xs:simpleType>
            </xs:union>
        </xs:simpleType>
    </xs:attribute>
    <xs:attribute name="cookie" type="xs:string"/>
    <xs:attribute name="response" type="YesOrNo"/>
    <xs:attribute name="dn" type="referenceObject"/>
</xs:complexType>
```

Response Syntax

```
<xs:element name="configScope" type="configScope"
substitutionGroup="externalMethod"/>
    <xs:complexType name="configScope" mixed="true">
        <xs:all>
            <xs:element name="outConfigs" type="configSet" minOccurs="0"/>
        </xs:all>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
        <xs:attribute name="errorCode" type="xs:unsignedInt"/>
        <xs:attribute name="errorDescr" type="xs:string"/>
        <xs:attribute name="invocationResult" type="xs:string"/>
        <xs:attribute name="dn" type="referenceObject"/>
    </xs:complexType>
```

Example

Request

```
<configScope
    dn="org-root"
    cookie="<real_cookie>"
    inClass="orgOrgRes"
    inHierarchical="false"
    inRecursive="false">
    <inFilter>
    </inFilter>
</configScope>
```

Response

```
<configScope dn="org-root"
    cookie="<real_cookie>"
    commCookie="2/15/0/2a53"
    srcExtSys="10.193.33.120"
    destExtSys="10.193.33.120"
    srcSvc="sam_extXMLApi"
    destSvc="service-reg_dme"
    response="yes">
    <outConfigs>
        <orgOrgCaps
            dn="org-root/org-caps"
            org="512"
            tenant="64"/>
        <orgOrgCounts
            dn="org-root/org-counter"
            org="36"
            tenant="7"/>
    </outConfigs>
</configScope>
```

eventSendHeartbeat

The following example shows how to send an event that indicates the current session is still active.

Request Syntax

```
<xs:element name="eventSendHeartbeat" type="eventSendHeartbeat"
substitutionGroup="externalMethod"/>
   <xs:complexType name="eventSendHeartbeat" mixed="true">
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
   </xs:complexType>
```

Response Syntax

```
<xs:element name="eventSendHeartbeat" type="eventSendHeartbeat"
substitutionGroup="externalMethod"/>
   <xs:complexType name="eventSendHeartbeat" mixed="true">
      <xs:attribute name="outSystemTime" type="dateTime"/>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="errorCode" type="xs:unsignedInt"/>
      <xs:attribute name="errorDescr" type="xs:string"/>
      <xs:attribute name="invocationResult" type="xs:string"/>
   </xs:complexType>
```

Example

Request

When the client application subscribes to an event or events using eventSubscribeApps or eventSubscribe, the Prime Network Services Controller sends eventSendHeartbeat periodically (default 120 seconds).

Response

```
<eventSendHeartbeat cookie="0/0/0/2a76"
   commCookie=""
   srcExtSys="0.0.0.0"
   destExtSys="0.0.0.0"
   srcSvc=""
   destSvc=""
   response="yes"
   outSystemTime="2010-11-12T20:38:19.630">
</eventSendHeartbeat>
```

eventSubscribe

The following example shows how to send a subscribe request for activity.

Request Syntax

```
<xs:element name="eventSubscribe" type="eventSubscribe"
substitutionGroup="externalMethod"/>
   <xs:complexType name="eventSubscribe" mixed="true">
      <xs:all>
         <xs:element name="inFilter" type="filterFilter" minOccurs="0"/>
      </xs:all>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
   </xs:complexType>
```

Response Syntax

```
<xs:element name="eventSubscribe" type="eventSubscribe"
```

```
substitutionGroup="externalMethod"/>
    <xs:complexType name="eventSubscribe" mixed="true">
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
        <xs:attribute name="errorCode" type="xs:unsignedInt"/>
        <xs:attribute name="errorDescr" type="xs:string"/>
        <xs:attribute name="invocationResult" type="xs:string"/>
    </xs:complexType>
```

Example

Request

```
<eventSubscribe
    cookie="<real_cookie>">
    <inFilter>
    </inFilter>
</eventSubscribe>
```

Response

Prime Network Services Controller sends no response or acknowledgement.

eventSubscribeApps

The following example shows a subscribe request for activity on specified applications. The client application can subscribe to the Prime Network Services Controller system to receive events from different applications. In eventApplication, ip is the IP address for the VM where the application (DME) is running. The client application can subscribe to receive events from the VSG as well, where ip should be the IP address for the VSG, and type is managed-endpoint.

Request Syntax

```
<xs:element name="eventSubscribeApps" type="eventSubscribeApps"
substitutionGroup="externalMethod"/>
    <xs:complexType name="eventSubscribeApps" mixed="true">
        <xs:all>
            <xs:element name="inAppList" type="configSet" minOccurs="0"/>
            <xs:element name="inFilter" type="filterFilter" minOccurs="0"/>
        </xs:all>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
    </xs:complexType>
```

Response Syntax

```
<xs:element name="eventSubscribeApps" type="eventSubscribeApps"
substitutionGroup="externalMethod"/>
    <xs:complexType name="eventSubscribeApps" mixed="true">
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
        <xs:attribute name="errorCode" type="xs:unsignedInt"/>
        <xs:attribute name="errorDescr" type="xs:string"/>
        <xs:attribute name="invocationResult" type="xs:string"/>
    </xs:complexType>
```

Example

Request

```
<eventSubscribeApps
    cookie="<real_cookie>"
    commCookie=""
    srcExtSys="0.0.0.0"
    destExtSys="0.0.0.0"
    <inAppList>
        <eventApplication
            ip="10.193.33.101"
            type="service-reg"/>
            <eventApplication
            ip="10.193.33.101"
            type="policy-mgr"/>
        <eventApplication
            ip="10.193.33.101"
            type="mgmt-controller"/>
    </inAppList>
    <inFilter>
    </inFilter>
</eventSubscribeApps>
```

Response

If the request is successful, Prime Network Services Controller sends no response or acknowledgement.

faultAckFault

The following example shows how to send an acknowledgement when a fault is recorded.

Request Syntax

```
<xs:element name="faultAckFault" type="faultAckFault"
substitutionGroup="externalMethod"/>
    <xs:complexType name="faultAckFault" mixed="true">
        <xs:attribute name="inId" type="xs:unsignedLong"/>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
    </xs:complexType>
```

Response Syntax

```
<xs:element name="faultAckFault" type="faultAckFault"
substitutionGroup="externalMethod"/>
    <xs:complexType name="faultAckFault" mixed="true">
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
        <xs:attribute name="errorCode" type="xs:unsignedInt"/>
        <xs:attribute name="errorDescr" type="xs:string"/>
        <xs:attribute name="invocationResult" type="xs:string"/>
    </xs:complexType>
```

Example

Request

```
<faultAckFault
    inHierarchical="false"
    cookie="<real_cookie>"
    inId="10120" />
```

Response

```
<faultAckFault
    cookie="<real_cookie>"
    commCookie="5/15/0/6c"
    srcExtSys="10.193.33.214"
    destExtSys="10.193.33.214"
    srcSvc="sam_extXMLApi"
    destSvc="resource-mgr_dme"
    response="yes">
```

```
</faultAckFault>
```

faultAckFaults

The following example shows how to send an acknowledgement when multiple faults are recorded.

Request Syntax

```
<xs:element name="faultAckFaults" type="faultAckFaults"
substitutionGroup="externalMethod"/>
   <xs:complexType name="faultAckFaults" mixed="true">
      <xs:all>
         <xs:element name="inIds" type="idSet" minOccurs="0"/>
      </xs:all>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
   </xs:complexType>
```

Response Syntax

```
<xs:element name="faultAckFaults" type="faultAckFaults"
substitutionGroup="externalMethod"/>
   <xs:complexType name="faultAckFaults" mixed="true">
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="errorCode" type="xs:unsignedInt"/>
      <xs:attribute name="errorDescr" type="xs:string"/>
      <xs:attribute name="invocationResult" type="xs:string"/>
   </xs:complexType>
```

Example

Request

```
<faultAckFaults
   cookie="<real_cookie>">
   <inIds>
      <id value="10656"/>
      <id value="10660"/>
   </inIds>
</faultAckFaults>
```

Response

```
<faultAckFaults
   cookie="<real_cookie>"
   commCookie="11/15/0/505"
   srcExtSys="10.193.34.70"
   destExtSys="10.193.34.70"
   srcSvc="sam_extXMLApi"
   destSvc="mgmt-controller_dme"
   response="yes">
</faultAckFaults>
```

faultResolveFault

The following example shows how to send a response when a fault has been resolved.

Request Syntax

```
<xs:element name="faultResolveFault" type="faultResolveFault"
substitutionGroup="externalMethod"/>
   <xs:complexType name="faultResolveFault" mixed="true">
```

```
        <xs:attribute name="inId" type="xs:unsignedLong"/>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
    </xs:complexType>
```

Response Syntax

```
<xs:element name="faultResolveFault" type="faultResolveFault"
substitutionGroup="externalMethod"/>
    <xs:complexType name="faultResolveFault" mixed="true">
        <xs:all>
            <xs:element name="outFault" type="configConfig" minOccurs="0"/>
        </xs:all>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
        <xs:attribute name="errorCode" type="xs:unsignedInt"/>
        <xs:attribute name="errorDescr" type="xs:string"/>
        <xs:attribute name="invocationResult" type="xs:string"/>
    </xs:complexType>
```

Example

Request

```
<faultResolveFault
    inHierarchical="false"
    cookie="<real_cookie>"
    inId="10120" />
```

Response

```
<faultResolveFault
    cookie="<real_cookie>"
    commCookie="5/15/0/6a"
    srcExtSys="10.193.33.214"
    destExtSys="10.193.33.214"
    srcSvc="sam_extXMLApi"
    destSvc="resource-mgr_dme"
    response="yes">
    <outFault>
        <faultInst
            ack="yes"
            cause="empty-pool"
            changeSet=""
            code="F0135"
            created="2010-11-19T11:02:41.568"
            descr="Virtual Security Gateway pool default is empty"
            dn="org-root/fwpool-default/fault-F0135"
            highestSeverity="minor"
            id="10120"
            lastTransition="2010-11-19T11:02:41.568"
            lc=""
            occur="1"
            origSeverity="minor"
            prevSeverity="minor"
            rule="fw-pool-empty"
            severity="minor"
            tags=""
            type="equipment"/>
    </outFault>
</faultResolveFault>
```

loggingSyncOcns

The following example shows how to retrieve event IDs from DME.

Request Syntax

```
<xs:element name="loggingSyncOcns" type="loggingSyncOcns"
substitutionGroup="externalMethod"/>
   <xs:complexType name="loggingSyncOcns" mixed="true">
      <xs:attribute name="inFromOrZero" type="xs:unsignedLong"/>
      <xs:attribute name="inToOrZero" type="xs:unsignedLong"/>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
   </xs:complexType>
```

Response Syntax

```
<xs:element name="loggingSyncOcns" type="loggingSyncOcns"
substitutionGroup="externalMethod"/>
   <xs:complexType name="loggingSyncOcns" mixed="true">
      <xs:all>
         <xs:element name="outStimuli" type="MethodSet" minOccurs="0"/>
      </xs:all>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="errorCode" type="xs:unsignedInt"/>
      <xs:attribute name="errorDescr" type="xs:string"/>
      <xs:attribute name="invocationResult" type="xs:string"/>
   </xs:complexType>
```

Example

Request

```
<loggingSyncOcns
   cookie="<real_cookie>"
   inFromOrZero="0"
   inToOrZero="4567000"/>
```

Response

List of event IDs.

orgResolveElements

Within a specified DN, this example retrieves managed objects that satisfy a query filter and searches managed objects starting at an organization, and optionally in the child organizations. If there is no organization with that DN, an empty map is returned. If found, it searches managed objects with specified class and filters. If inHierarchical = true, the returned objects will also contain their children. If inHierarchical = false, only the matching objects are returned. If inSingleLevel = true, only the objects at the starting organization level are returned. If inSingleLevel = false, objects in child organizations are also returned.

Request Syntax

```
<xs:element name="orgResolveElements" type="orgResolveElements"
substitutionGroup="externalMethod"/>
   <xs:complexType name="orgResolveElements" mixed="true">
      <xs:all>
         <xs:element name="inFilter" type="filterFilter" minOccurs="0"/>
      </xs:all>
      <xs:attribute name="inClass" type="namingClassId"/>
      <xs:attribute name="inSingleLevel">
         <xs:simpleType>
            <xs:union memberTypes="xs:boolean">
```

```
                <xs:simpleType>
                    <xs:restriction base="xs:string">
                        <xs:enumeration value="no"/>
                        <xs:enumeration value="yes"/>
                    </xs:restriction>
                </xs:simpleType>
            </xs:union>
        </xs:simpleType>
    </xs:attribute>
    <xs:attribute name="inHierarchical">
        <xs:simpleType>
            <xs:union memberTypes="xs:boolean">
                <xs:simpleType>
                    <xs:restriction base="xs:string">
                        <xs:enumeration value="no"/>
                        <xs:enumeration value="yes"/>
                    </xs:restriction>
                </xs:simpleType>
            </xs:union>
        </xs:simpleType>
    </xs:attribute>
    <xs:attribute name="cookie" type="xs:string"/>
    <xs:attribute name="response" type="YesOrNo"/>
    <xs:attribute name="dn" type="referenceObject"/>
</xs:complexType>
```

Response Syntax

```
<xs:element name="orgResolveElements" type="orgResolveElements"
substitutionGroup="externalMethod"/>
    <xs:complexType name="orgResolveElements" mixed="true">
        <xs:all>
            <xs:element name="outConfigs" type="configMap" minOccurs="0">
                <xs:unique name="unique_map_key_5">
                    <xs:selector xpath="pair"/>
                    <xs:field xpath="@key"/>
                </xs:unique>
            </xs:element>
        </xs:all>
        <xs:attribute name="cookie" type="xs:string"/>
        <xs:attribute name="response" type="YesOrNo"/>
        <xs:attribute name="errorCode" type="xs:unsignedInt"/>
        <xs:attribute name="errorDescr" type="xs:string"/>
        <xs:attribute name="invocationResult" type="xs:string"/>
        <xs:attribute name="dn" type="referenceObject"/>
    </xs:complexType>
```

Example

Request

```
<orgResolveElements
    dn="org-root/org-Cola"
    cookie="<real_cookie>"
    commCookie="7/15/0/19"
    inClass="policyPolicySet"
    inSingleLevel="no"
    inHierarchical="no">
    <inFilter>
    </inFilter>
</orgResolveElements>
```

Response

```
<orgResolveElements
    dn="org-root/org-Cola"
    cookie="<real_cookie>"
    commCookie="7/15/0/19"
    srcExtSys="10.193.33.221"
    destExtSys="10.193.33.221"
    srcSvc="sam_extXMLApi"
    destSvc="policy-mgr_dme"
    response="yes"
    errorCode="0"
    errorDescr="">
    <outConfigs>
        <pair key="pset-default">
            <policyPolicySet
                descr="The default Policy Set"
                dn="org-root/pset-default"
                intId="10082"
                name="default"/>
        </pair>
        <pair key="pset-myPolicySet3">
            <policyPolicySet
                descr=""
                dn="org-root/org-Cola/pset-myPolicySet3"
                intId="12289"
                name="myPolicySet3"/>
        </pair>
        <pair key="pset-policySetSanity">
            <policyPolicySet
                descr=""
                dn="org-root/org-Cola/pset-policySetSanity"
                intId="24627"
                name="policySetSanity"/>
        </pair>
        <pair key="pset-pci_compliance_f">
            <policyPolicySet
                descr=""
                dn="org-root/pset-pci_compliance_f"
                intId="24539"
                name="pci_compliance_f"/>
        </pair>
        <pair key="pset-pci_compliance_h">
            <policyPolicySet
                descr=""
                dn="org-root/pset-pci_compliance_h"
                intId="24541"
                name="pci_compliance_h"/>
        </pair>
    </outConfigs>
</orgResolveElements>
```

orgResolveInScope

The following example shows how the system looks up the organization with the given DN, and (optional) parent organizations recursively to the root. If an organization is not found, an empty map is returned. If found, it searches all pools with specified class and filters.

Note If inSingleLevel = false, the system searches parent organizations up to the root directory.

Request Syntax

```
<xs:element name="orgResolveInScope" type="orgResolveInScope"
substitutionGroup="externalMethod"/>
   <xs:complexType name="orgResolveInScope" mixed="true">
      <xs:all>
         <xs:element name="inFilter" type="filterFilter" minOccurs="0"/>
      </xs:all>
      <xs:attribute name="inClass" type="namingClassId"/>
      <xs:attribute name="inSingleLevel">
         <xs:simpleType>
            <xs:union memberTypes="xs:boolean">
               <xs:simpleType>
                  <xs:restriction base="xs:string">
                     <xs:enumeration value="no"/>
                     <xs:enumeration value="yes"/>
                  </xs:restriction>
               </xs:simpleType>
            </xs:union>
         </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="inHierarchical">
         <xs:simpleType>
            <xs:union memberTypes="xs:boolean">
               <xs:simpleType>
                  <xs:restriction base="xs:string">
                     <xs:enumeration value="no"/>
                     <xs:enumeration value="yes"/>
                  </xs:restriction>
               </xs:simpleType>
            </xs:union>
         </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="dn" type="referenceObject"/>
   </xs:complexType>
```

Response Syntax

```
<xs:element name="orgResolveInScope" type="orgResolveInScope"
substitutionGroup="externalMethod"/>
   <xs:complexType name="orgResolveInScope" mixed="true">
      <xs:all>
         <xs:element name="outConfigs" type="configMap" minOccurs="0">
            <xs:unique name="unique_map_key_6">
               <xs:selector xpath="pair"/>
               <xs:field xpath="@key"/>
            </xs:unique>
         </xs:element>
      </xs:all>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="errorCode" type="xs:unsignedInt"/>
      <xs:attribute name="errorDescr" type="xs:string"/>
      <xs:attribute name="invocationResult" type="xs:string"/>
      <xs:attribute name="dn" type="referenceObject"/>
   </xs:complexType>
```

Example

Request

```
<orgResolveInScope
    cookie="<real_cookie>"
    dn="org-root/org-Cola"
    inClass="policyVirtualNetworkServiceProfile"
    inHierarchical="true"
    InSingleLevel="false" >
    <inFilter>
        <eq class="policyVirtualNetworkServiceProfile"
            property="name"
            value="spsanity" />
    </inFilter>
</orgResolveInScope>
```

Response

```
<orgResolveInScope
    dn="org-root/org-Cola"
    cookie="<real_cookie>"
    commCookie="7/15/0/1c35"
    srcExtSys="10.193.34.70"
    destExtSys="10.193.34.70"
    srcSvc="sam_extXMLApi"
    destSvc="policy-mgr_dme"
    response="yes">
    <outConfigs>
        <pair key="vnsp-spsanity">
            <policyVirtualNetworkServiceProfile
                childAction="deleteNonPresent"
                descr=""
                dn="org-root/org-Cola/vnsp-spsanity"
                intId="82018"
                name="spsanity"
                policySetNameRef="policySetSanity"
                vnspId="41">
            <policyVnspAVPair
                childAction="deleteNonPresent"
                descr=""
                id="1"
                intId="82019"
                name=""
                rn="vnsp-avp-1">
                <policyAttributeValue
                    childAction="deleteNonPresent"
                    id="1"
                    rn="attr-val1"
                    value="DEV"/>
                <policyAttributeDesignator
                    attrName="dept"
                    childAction="deleteNonPresent"
                    rn="attr-ref"/>
                </policyVnspAVPair>
            </policyVirtualNetworkServiceProfile>
        </pair>
    </outConfigs>
</orgResolveInScope>
```

poolResolveInScope

The following example shows how the system looks up the pool with the given DN, and (optional) parent pools recursively to the root. If no pool exists, an empty map is returned. If found, the system searches all pools with the specified class and filters.

Note If inSingleLevel = false, the system searches parent pools up to the root directory.

Request Syntax

```
<xs:element name="poolResolveInScope" type="poolResolveInScope"
substitutionGroup="externalMethod"/>
   <xs:complexType name="poolResolveInScope" mixed="true">
      <xs:all>
         <xs:element name="inFilter" type="filterFilter" minOccurs="0"/>
      </xs:all>
      <xs:attribute name="inClass" type="namingClassId"/>
      <xs:attribute name="inSingleLevel">
         <xs:simpleType>
            <xs:union memberTypes="xs:boolean">
               <xs:simpleType>
                  <xs:restriction base="xs:string">
                     <xs:enumeration value="no"/>
                     <xs:enumeration value="yes"/>
                  </xs:restriction>
               </xs:simpleType>
            </xs:union>
         </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="inHierarchical">
         <xs:simpleType>
            <xs:union memberTypes="xs:boolean">
               <xs:simpleType>
                  <xs:restriction base="xs:string">
                     <xs:enumeration value="no"/>
                     <xs:enumeration value="yes"/>
                  </xs:restriction>
               </xs:simpleType>
            </xs:union>
         </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="cookie" type="xs:string"/>
      <xs:attribute name="response" type="YesOrNo"/>
      <xs:attribute name="dn" type="referenceObject"/>
   </xs:complexType>
```

Response Syntax

```
<xs:element name="poolResolveInScope" type="poolResolveInScope"
substitutionGroup="externalMethod"/>
```

```
<xs:complexType name="poolResolveInScope" mixed="true">
   <xs:all>
      <xs:element name="outConfigs" type="configMap" minOccurs="0">
         <xs:unique name="unique_map_key_9">
            <xs:selector xpath="pair"/>
            <xs:field xpath="@key"/>
         </xs:unique>
      </xs:element>
   </xs:all>
   <xs:attribute name="cookie" type="xs:string"/>
   <xs:attribute name="response" type="YesOrNo"/>
   <xs:attribute name="errorCode" type="xs:unsignedInt"/>
   <xs:attribute name="errorDescr" type="xs:string"/>
   <xs:attribute name="invocationResult" type="xs:string"/>
   <xs:attribute name="dn" type="referenceObject"/>
</xs:complexType>
```

Example

Request

```
<poolResolveInScope
   dn="org-root/org-tenant1"
   cookie="<real_cookie>"
   />
```

Response

```
<poolResolveInScope
   dn="org-root/org-cisco"
   cookie="<real_cookie>"
   commCookie="5/12/0/19"
   srcExtSys="172.25.103.136"
   destExtSys="172.25.103.136"
   srcSvc="sam_extXMLApi"
   destSvc="resource-mgr_dme"
   response="yes">
   <outConfigs>
      <pair key="fwpool-default">
         <fwPool
            assigned="0"
            descr="Default Pool of firewall resources"
            dn="org-root/fwpool-default"
            fltAggr="65536"
            id="1"
            intId="10066"
            name="default"
            size="0"/>
      </pair>
   </outConfigs>
</poolResolveInScope>
```

Appendix: UML Diagrams

This section contains the following topics:

- VPN Model
- Generic Rule-Based Policy Model

VPN Model

Figure 4 VPN Model Granular Device View

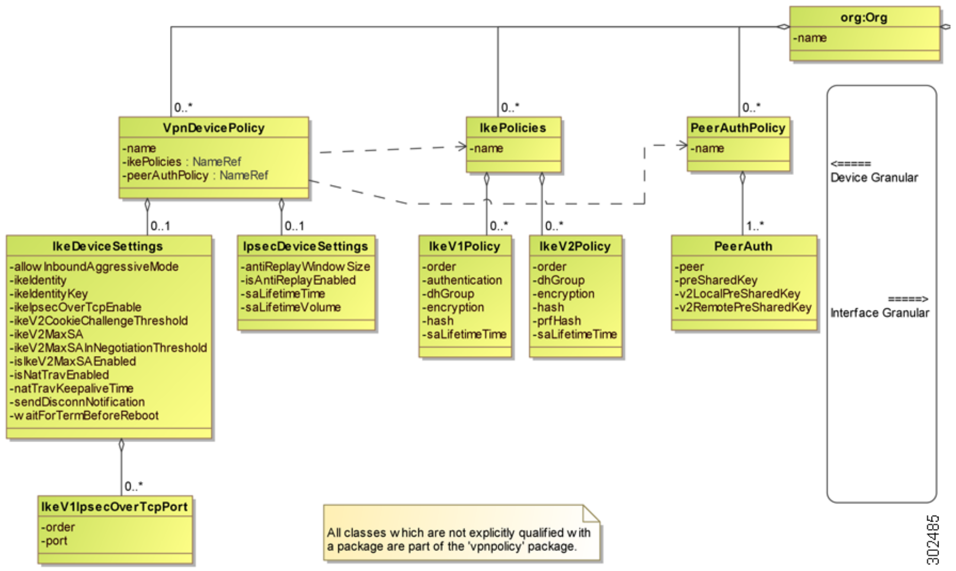
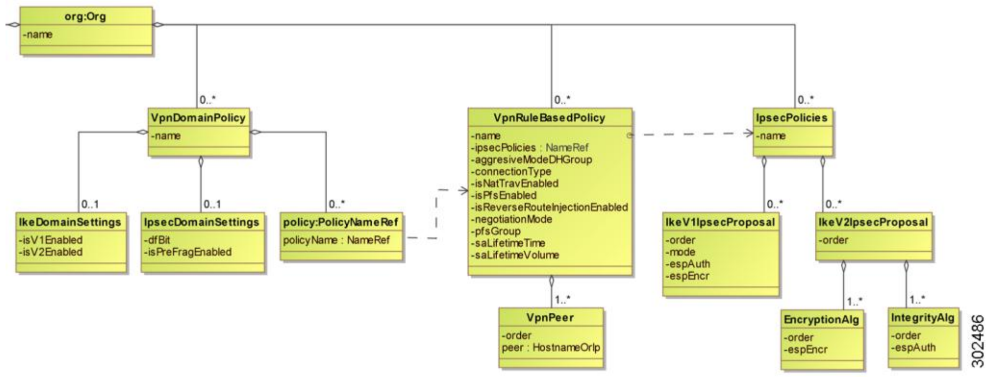
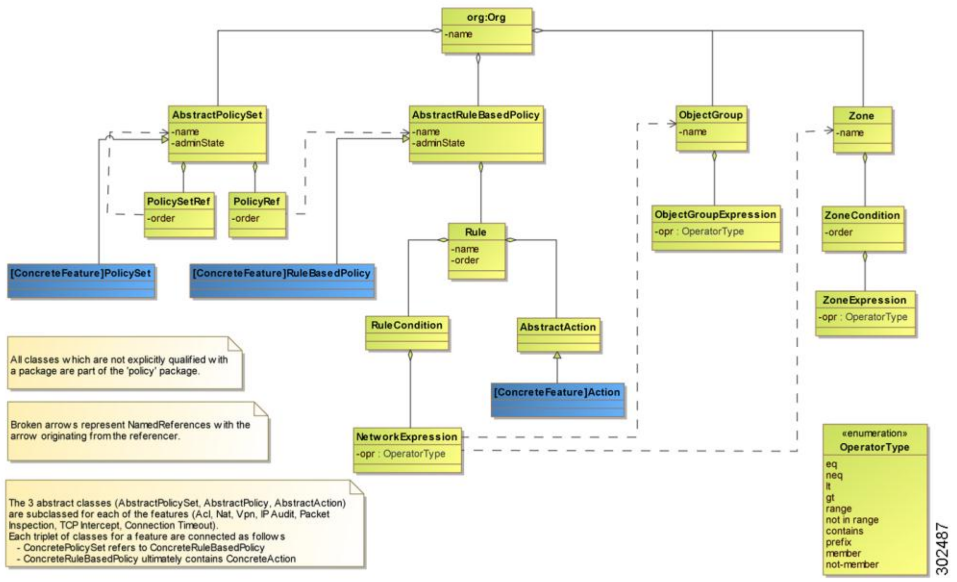


Figure 5 VPN Model Granular Interface View



Generic Rule-Based Policy Model

Figure 6 Generic Rule Based Policy Model



All classes which are not explicitly qualified with a package are part of the 'policy' package.

Broken arrows represent NamedReferences with the arrow originating from the referencer.

The 3 abstract classes (AbstractPolicySet, AbstractPolicy, AbstractAction) are subclassed for each of the features (Acl, Nat, Vpn, IP Audit, Packet Inspection, TCP Intercept, Connection Timeout).
Each triplet of classes for a feature are connected as follows
- ConcretePolicySet refers to ConcreteRuleBasedPolicy
- ConcreteRuleBasedPolicy ultimately contains ConcreteAction

Index

Obtaining Documentation, Obtaining Support, and Security Guidelines

For information on obtaining documentation, obtaining support, providing documentation feedback, security guidelines, and also recommended aliases and general Cisco documents, 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

Cisco Network Services Manager 3.0 XML API Guide

OL-28369-01