CISCO SYSTEMS

Cisco CallManager
Extension Mobility API Developer Guide

Release 4.1(2)

Corporate Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
http://www.cisco.com
Tel: 408 526-4000
        800 553-NETS (6387)
Fax: 408 526-4100

CONTENTS

Preface

This section explains the objectives, intended audience, and organization of this publication and describes the conventions that convey instructions and other information.

This preface covers the following sections:

- Purpose
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Purpose

Cisco Extension Mobility service, a feature of Cisco CallManager, allows a device, usually a Cisco IP Phone, to temporarily embody a new device profile, including lines, speed dials, and services.

The Cisco Extension Mobility service provides a fairly rich API, which enables extension mobility on IP phones and allows application control over authentication, scheduling, and availability.

An application that uses Cisco Extension Mobility service represents an IP phone service that allows a user to enter a userID and PIN at the phone itself and log into the phone. The architecture and implementation of Extension Mobility make many other applications possible.

Some examples are:

- An application that automatically activates phones for employees when they reserve a particular desk for a particular time (the scheduling application).

- A lobby phone does not have a line appearance until a user logs in.

Audience

The *Cisco CallManager 4.1(2) Extension Mobility API Developer Guide* provides information for developers who write applications that extend the functionality of Cisco Extension Mobility service. You should be familiar with Extensible Markup Language (XML).

New and Changed Information

This section describes any new features and or changes that are pertinent to the specified release of Cisco CallManager for Cisco Extension Mobility API developers.

Cisco CallManager Release 4.1(2)

The following list provides the features or changes for Cisco Extension Mobility service API developers in Cisco CallManager release 4.1(2):

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Cisco CallManager Release 4.0(1)

The following list provides the features or changes for Cisco Extension Mobility service API developers in Cisco CallManager release 4.0(1):

- Tomcat Servlet architecture replaces the ASP block.
- Connection from the IIS to the Tomcat server uses the established AJP mechanism.
- The Login Service Java Object runs in the Tomcat Servlet.
- The Tomcat Servlet Logout Scheduler assumes the functionality that are previously performed by the Logout NT Service and contains a new data structure in the scheduling information.
- Communication from the Extension Mobility service to the DBL uses JNI instead of COM.

Organization

The following organization applies for this guide.

Table 1   Organization

Chapter	Description
Chapter 1, "Understanding the Cisco Extension Mobility Service"	This chapter includes high-level concepts that are important in understanding the Cisco Extension Mobility service system.
Chapter 2, "Using the Cisco Extension Mobility API"	This chapter includes an overview of configuring EM services, messages, message DTDs, and error codes.

Related Documentation

For more information on Extension Mobility, refer to the following documents:

- *Cisco CallManager Administration Guide*
- *Cisco CallManager System Guide*

- *Cisco CallManager Features and Services Guide*
- *Cisco CallManager Extended Services Administrator Guide*

Conventions

This document uses the following conventions:

Convention	Description
boldface font	Commands and keywords are in **boldface**.
italic font	Arguments for which you supply values are in *italics*.
[ ]	Elements in square brackets are optional.
{ x	y	z }	Alternative keywords are grouped in braces and separated by vertical bars.
[x	y	z]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
`screen` font	Terminal sessions and information the system displays are in `screen` font.
`boldface screen` font	Information you must enter is in **`boldface screen`** font.
`italic screen` font	Arguments for which you supply values are in *`italic screen`* font.
→	This pointer highlights an important line of text in an example.

Convention	Description
^	The symbol ^ represents the key labeled Control—for example, the key combination ^D in a screen display means hold down the Control key while you press the D key.
< >	Nonprinting characters, such as passwords, are in angle brackets.

Notes use the following conventions:

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the publication.

Timesavers use the following conventions:

Timesaver Means *the described action saves time*. You can save time by performing the action described in the paragraph.

Tips use the following conventions:

Tip Means *the following are useful tips*.

Cautions use the following conventions:

Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Warnings use the following conventions:

Warning **This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, you must be aware of the hazards involved with electrical circuitry and familiar with standard practices for preventing accidents.**

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation at this URL:

http://www.cisco.com/univercd/home/home.htm

You can access the Cisco website at this URL:

http://www.cisco.com

You can access international Cisco websites at this URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation

You can find instructions for ordering documentation at this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpck/pdi.htm

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Ordering tool:

  http://www.cisco.com/en/US/partner/ordering/index.shtml

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

Documentation Feedback

You can send comments about technical documentation to bug-doc@cisco.com.

You can submit comments by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

For all customers, partners, resellers, and distributors who hold valid Cisco service contracts, Cisco Technical Support provides 24-hour-a-day, award-winning technical assistance. The Cisco Technical Support Website on Cisco.com features extensive online support resources. In addition, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not hold a valid Cisco service contract, contact your reseller.

Cisco Technical Support Website

The Cisco Technical Support Website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, 365 days a year at this URL:

http://www.cisco.com/techsupport

Access to all tools on the Cisco Technical Support Website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

http://tools.cisco.com/RPF/register/register.do

Developer Support

The Developer Support Program provides formalized support for Cisco Systems interfaces to enable developers, customers, and partners in the Cisco Service Provider solutions Ecosystem and Cisco AVVID Partner programs to accelerate their delivery of compatible solutions.

The Developer Support Engineers are an extension of the product technology engineering teams. They have direct access to the resources necessary to provide expert support in a timely manner.

For additional information on this program, refer to the Developer Support Program Web Site at www.cisco.com/go/developer support/.

Developers using the *Cisco CallManager 4.1(2) Extension Mobility API Developer Guide* are encouraged to join the Cisco Developer Support Program. This new program provides a consistent level of support while leveraging Cisco interfaces in development projects.

Note Cisco Technical Assistance Center (TAC) support does not include Extension Mobility API developer support and is limited to Cisco AVVID installation/configuration and Cisco-developed applications. For more information about the Developer Support Program, please contact Cisco at developer-support@cisco.com.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool automatically provides recommended solutions. If your issue is not resolved using the recommended resources, your service request will be assigned to a Cisco TAC engineer. The TAC Service Request Tool is located at this URL:

http://www.cisco.com/techsupport/servicerequest

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco TAC engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)
EMEA: +32 2 704 55 55
USA: 1 800 553 2447

For a complete list of Cisco TAC contacts, go to this URL:

http://www.cisco.com/techsupport/contacts

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—Your network is "down," or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- Cisco Marketplace provides a variety of Cisco books, reference guides, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:

  http://www.cisco.com/go/marketplace/

- The Cisco *Product Catalog* describes the networking products offered by Cisco Systems, as well as ordering and customer support services. Access the Cisco Product Catalog at this URL:

  http://cisco.com/univercd/cc/td/doc/pcat/

- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:

  http://www.ciscopress.com

- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:

  http://www.cisco.com/packet

- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:

  http://www.cisco.com/go/iqmagazine

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

  http://www.cisco.com/ipj

- World-class networking training is available from Cisco. You can view current offerings at this URL:

  http://www.cisco.com/en/US/learning/index.html

Understanding the Cisco Extension Mobility Service

The Cisco Extension Mobility service feature allows a device, usually a Cisco IP Phone, to temporarily embody a new device profile, including lines, speed dials, and services.

You can use the XML-based Cisco Extension Mobility service API with your applications, so they can take advantage of Cisco Extension Mobility service functionality. For details about how to use the Cisco Extension Mobility service API, see Using the Cisco Extension Mobility API.

To successfully develop an application that uses the Cisco Extension Mobility service, you need to understand how the service operates and how your application fits into the Cisco Extension Mobility service system.

This chapter includes these high-level concepts that are important in understanding the Cisco Extension Mobility service system:

- Cisco Extension Mobility Service Architecture, page 1-2
- Device Profiles, page 1-6
- Login Policy, page 1-7
- Automatic Logout, page 1-7
- Authentication, page 1-7

Cisco Extension Mobility Service Architecture

This section explains the Cisco Extension Mobility service system components and how they work together with your application. It also gives a more detailed explanation of how the Login Service component works because the Login Service represents the main component with which your application communicates with.

The Cisco Extension Mobility Service System Components

Table 1-1 lists the basic architectural components of the Cisco Extension Mobility service system and a description of each component. The Cisco Extension Mobility service system comprises your application, the Login Application, and the Cisco Extension Mobility service. Every other component belongs to the Cisco Extension Mobility service. See Figure 1-1 for a diagram of how all the components of the Cisco Extension Mobility service system relates to each other.

Table 1-1   Cisco Extension Mobility Service System Components

Component	Description
[1]Login Application	Any application or process which submits a request to the Login Service via the XML over HTTP interface.
Login Service	The service that validates requests from a Login Application and sends back request and query responses.
LDAP Directory	Lightweight Directory Access Protocol Directory (LDAP) stores information for Cisco CallManager.
DBL	Database Layer (DBL) manages Cisco CallManager database transactions that involve data such as Device Profiles, and so on.
Database Layer Monitor	Database Layer Monitor service notifies other processes of changes in the Cisco CallManager database.

Table 1-1   Cisco Extension Mobility Service System Components (continued)

Component	Description
CallProcessing	CallProcessing represents the core Cisco CallManager process that has responsibility for maintaining device connections.
CTI	Computer Telephony Interface (CTI) comprises the set of processes that expose programmable APIs for call control.
TAPI/JTAPI	TAPI and JTAPI support call control.

1.   The Login Application is your application.

How the Cisco Extension Mobility Service System Works

This section describes what happens when your application sends a message to the Login Service to use Cisco Extension Mobility service functionality.

Figure 1-1 shows how Cisco Extension Mobility service system components connect to each other.

Figure 1-1   Cisco Extension Mobility Service System
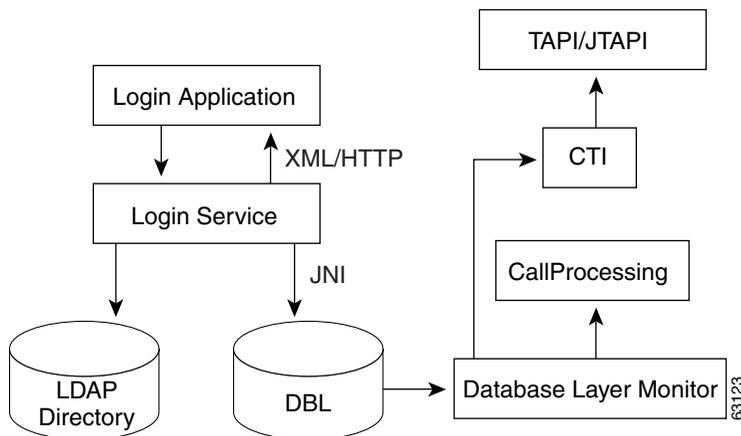
Your Login Application submits an XML message to the Login Service servlet by using Hypertext Transfer Protocol (HTTP). The Login Service uses the LDAP Directory to check the UserID and PIN in the message from the Login Application.

If the UserID and PIN are valid, the Login Service executes the request by communicating with the database layer (DBL) through JNI. For more details about how the Login Service works, see "The Cisco Extension Mobility Login Service" section on page 1-4.

If the DBL changes the Device Profile for the device (for a login or logout request), it tells the Database Layer Monitor. The Database Layer Monitor passes this information on to the CallProcessing and CTI components. CallProcessing tells the Cisco IP Phone that it needs to restart itself to load the new Device Profile. For information about Device Profiles, see "Device Profiles" section on page 1-6.

The CTI layer notifies JTAPI and TAPI applications that are monitoring the device or user that the application control list has changed.

When the DBL successfully completes a transaction, it tells the Login Service. The Login Service then sends an XML response that the transaction was successful back to your Login Application by using HTTP.

Note   If the transaction is not successful, the Login Service sends your Login Application an appropriate error message.

The Cisco Extension Mobility Login Service

Your Login Application communicates with the Cisco Extension Mobility service through the Cisco Extension Mobility Login Service component.

When the Login Service component receives an HTML message from your Login Application, it uses HTTP to send an XML response message. The response to a request serves as success or failure message, and the response to a query serves as a query result message. For details about messages, see Messages, page 2-2

Figure 1-2 shows a close-up of the Login Service component of the Cisco Extension Mobility system.

Figure 1-2   Cisco Extension Mobility Login Service Component
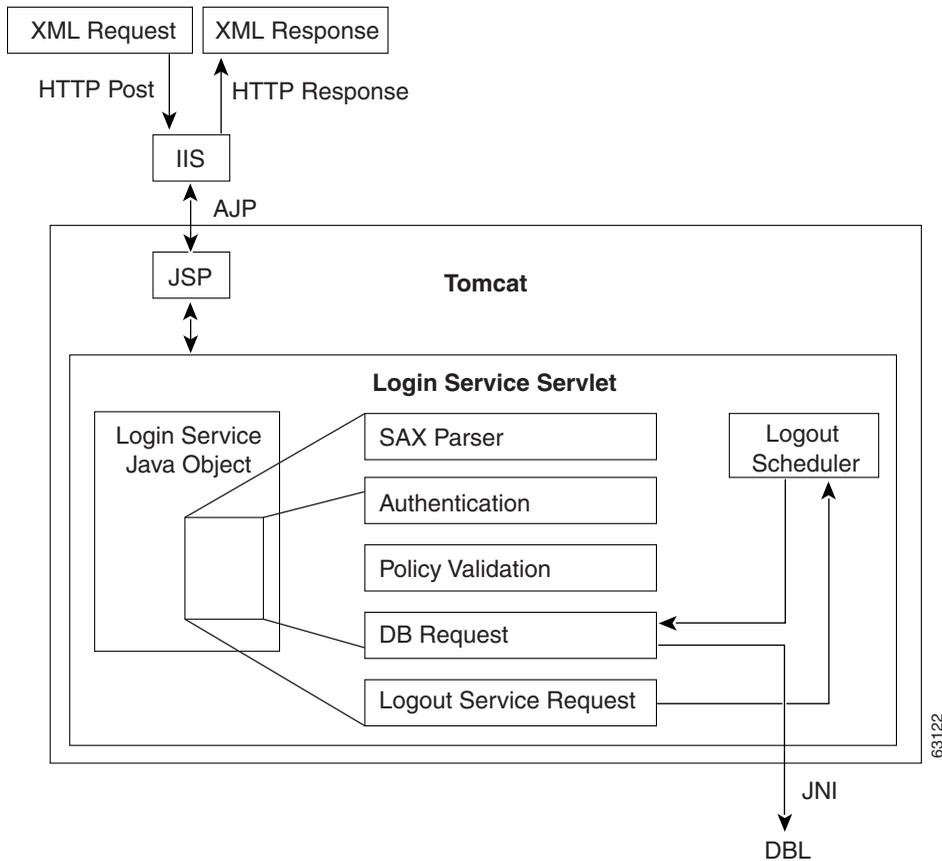
The Login Service component sends an appropriate XML error response to your Login Application if authentication fails, a precondition is not met, it cannot contact the DBL, or the DBL returns an error.

For more information about authentication, see the "Authentication" section on page 1-7. The Login Service Java Object's Policy Validation engine checks the pre-conditions. For information about login policies, see the "Login Policy" section on page 1-7.

For information about the automatic logout feature, see the "Automatic Logout" section on page 1-7.

Device Profiles

Device profile acts as the basic unit of transaction for Cisco Extension Mobility. A device profile contains all the configuration information, such as line appearances, speed dials, and services, for a particular device. You can think of it as a "virtual device." It has all the properties of a device except physical characteristics such as a Media Access Control (MAC) address and a directory URL.

When a user logs in, the User Device Profile replaces the current device configuration. When a user logs out, the Logout Device Profile replaces the User Device Profile.

Logout Device Profile

Cisco Extension Mobility requires a Logout Device Profile for each configured device. Cisco Extension Mobility uses the Logout Device Profile, which can be either an Auto-Generated or User Device Profile, as the "logged out" configuration of the device.

Two types of device profiles exist: Auto-Generated Device Profiles and User Device Profiles.

- Auto-Generated Device Profile—can only be used as a Logout Device Profile. This is a snapshot of the existing device's configuration. It cannot be associated with a user.

- User Device Profile—is generated by an administrator and associated with a user in the same manner as any other device.

Note To create an Auto-Generated Device Profile, the system configures a device and a snapshot of the device is taken and saved as a device profile with the prefix ADP (Auto-Generated Device Profile) and the MAC address of the device. For example, the Auto-Generated Device Profile for the device SEP000011112222 specifies ADP000011112222.

Note Cisco Extension Mobility fully supports the Cisco IP Phone 7960 and the Cisco IP Phone 7940 but not the Cisco IP Phone model 7910 and older devices.

Login Policy

Only a single user can log in at a time on a particular device. Subsequent attempts by users to log in on a device before the previous user has logged out will fail. You also can not log out of a device to which no user has logged in. These error conditions generate error messages.

Automatic Logout

The Logout Scheduler in the Login Service times all login occurrences if you have specified a system maximum login time. If you have not set the login duration, the automatic logout period for that device defaults to the system maximum time.

Authentication

The Cisco Extension Mobility service allows authentication by proxy. That is, a user with Cisco Extension Mobility proxy rights can log in any user to any device.

What this means is that an application can be responsible for authenticating a user in whatever way that the designer of the application sees fit: by using a password, PIN, hardware key, biometrics, and so on. The application must provide valid credentials for itself (the application), so the Cisco Extension Mobility Service knows that the application is provisioned in the system and allowed to log users in and out.

To this end, you must ensure that a special user that corresponds to the application is configured in the Directory. This user, representing the application, has a standard LDAP UserID and PIN. The application must send a valid UserID and PIN to log a user in or log out from a device.

Note   This mechanism requires configuring a UserID and PIN for the application; this is done by using Cisco CallManager Administration, User Configuration.

2

Using the Cisco Extension Mobility API

The Cisco Extension Mobility API gets exposed as an Extensible Markup Language (XML) interface via HTTP. The administrator of the system designates a website as the entry point to the API, and all requests and queries are made through those URLs. This website also provides the document type definitions (DTDs) that define the XML for requests, queries, and responses. This document includes the DTDs, along with examples.

The XML input gets submitted via an HTTP POST. A field named "xml" contains the XML string that defines the request or query. The response to this HTTP POST represents a pure XML response with either a success or failure indicator for a request or the response to a query.

This chapter includes the following sections:

- Configuration, page 2-2
- Messages, page 2-2
- Message Document Type Definitions, page 2-4
- Message Examples, page 2-7
- Login Service Error Codes, page 2-13

Configuration

Cisco Extension Mobility is an application designed to accompany Cisco CallManager. As such, all necessary Cisco Extension Mobility service API components get installed with the standard Cisco CallManager installation.

To use Cisco Extension Mobility, create a device profile for the user logging in and for the target device.

Use the following steps to configure Cisco Extension Mobility service:

- Create a User Device Profile.

- Assign a User Device Profile to a User.

- Assign authentication proxy rights to a UserID.

- Assign a Logout Device Profile to a target device.

- Configure the System Parameters.

Note
- Technically, no need exists to assign a profile to a user. The device profile may be specified at login time.

- System Parameters use defaults if they are not manually configured.

- Extension Mobility must be enabled on a device-by-device basis.

For details on how to configure the User Device Profile, refer to the *Cisco CallManager Administration Guide*, *Cisco CallManager Extended Services Administrator Guide,* or *Cisco CallManager Features and Services Guide*.

Messages

You communicate between your login application and the Cisco Extension Mobility Login service by sending and receiving messages that are written in XML. The XML messages that you send must follow the rules set by the Message DTDs that are described in the "Message Document Type Definitions" section on page 2-4.

The default URL for login and logout requests and system queries follows:

http://<server>/emservice/EMServiceServlet

The application sends authentication information, including an Application ID and an Application Certificate, at the start of message.

A password represents the only type of certificate that is currently supported. All messages must include a valid appID and appPassword, or they will not be processed.

For examples of legal Cisco Extension Mobility messages, see the "Message Examples" section on page 2-7.

Login Requests

Login requests provide the cornerstone of this service, and currently they offer the most flexible and complex message type. The information that is required to process a login request must include the device that is to be logged in to and the UserID of the user who is logging into that device. If a device profile other than the default Device Profile that has been associated with the user is to be used, you can specify that profile name. If the system is to log the user out automatically after a particular time, you can also specify that.

Logout Requests

To log out, you only need to provide the device name in the message.

Device-User Queries

A Device-User query represents a query wherein the application specifies a list of one or more devices, and the system returns the userID of the user who is currently logged on to each device.

User-Devices Queries

A User-Devices query represents a query in which the application specifies a list of one or more users, and the system returns the list of devices into which a particular user is currently logged in.

Message Document Type Definitions

A Message Document Type Definition (DTD) designates an XML list that specifies precisely which elements can appear in a request, query, or response document. It also specifies the contents and attributes of the elements.

You communicate between your login application and the Cisco Extension Mobility Login Service by sending and receiving XML documents. These XML documents must follow the rules set by the Message DTDs.

For more details about messages, see the For examples of how the Message DTDs are used, see the

Request DTD

The Request DTD defines the login and logout messages that your application can send to the Cisco Extension Mobility Login Service.

```
<!-- login requests DTD -->
<!ELEMENT request (appInfo, (login | logout))>
<!ELEMENT appInfo (appID, appCertificate)>
<!ELEMENT appID        (#PCDATA)>
<!ELEMENT appCertificate (#PCDATA)>
<!ELEMENT login (deviceName, userID, deviceProfile?, exclusiveDuration?)>
<!ELEMENT logout (deviceName)>
<!ELEMENT deviceName    (#PCDATA)>
<!ELEMENT userID        (#PCDATA)>
<!ELEMENT deviceProfile  (#PCDATA)>
```

<!ELEMENT exclusiveDuration (time | indefinite)>

<!ELEMENT time   (#PCDATA)>

<!ELEMENT indefinite EMPTY>

Login or Logout Response DTD

Login or Logout Response DTD defines the messages that your application receives from the Cisco Extension Mobility Login Service when it sends a login or logout request message.

<!-- login response DTD -->

<!ELEMENT response (success | failure)>

<!ELEMENT success EMPTY>

<!ELEMENT failure (error)>

<!ELEMENT error (#PCDATA)>

<!ATTLIST error

        code NMTOKEN #REQUIRED>

Query DTD

The Query DTD defines the Device-User and User-Devices messages that your application sends the Cisco Extension Mobility service to find out which user is logged into a device or to which devices users are logged in.

<!-- login query DTD -->

<!ELEMENT query (appInfo, (deviceUserQuery | userDevicesQuery))>

<!ELEMENT appInfo (appID, appCertificate)>

<!ELEMENT appID   (#PCDATA)>

<!ELEMENT appCertificate (#PCDATA)>

<!ELEMENT deviceUserQuery (deviceName+)>

```
<!ELEMENT userDevicesQuery (userID+)>
<!ELEMENT deviceName    (#PCDATA)>
<!ELEMENT userID        (#PCDATA)>
```

Query Response DTD

The Query Response DTD defines the messages that your application receives from the Cisco Extension Mobility service when it sends the service a Device-User or User-Devices query.

```
<!-- login query results DTD -->
<!ELEMENT response (deviceUserResults | userDevicesResults | failure)>
<!ELEMENT deviceUserResults (device+)>
<!ELEMENT userDevicesResults (user+)>
<!ELEMENT device (userID | none | doesNotExist)>
<!ATTLIST device
      name NMTOKEN #REQUIRED>
<!ELEMENT user (deviceName+ | none | doesNotExist)>
<!ATTLIST user
      id NMTOKEN #REQUIRED>
<!ELEMENT userID (#PCDATA)>
<!ELEMENT deviceName (#PCDATA)>
<!ELEMENT none EMPTY>
<!ELEMENT doesNotExist EMPTY>
<!ELEMENT failure (errorMessage)>
<!ELEMENT errorMessage (#PCDATA)>
```

Message Examples

This section provides examples of various types of messages to aid in understanding how to use the message DTDs to communicate between your application and the Cisco Extension Mobility service. Table 2-1 lists each example type, a description of what the example message means, and a reference to that example. For more details about messages, see the "Messages" section on page 2-2. For details about the DTDs, see the "Message Document Type Definitions" section on page 2-4.

Table 2-1   Message Examples

Message Example Type	Description	Example Reference
Login Request	The 7960LoginApp application requests that user rknotts be logged into device SEP003094C25B15.	Example 2-1
Login Request	The WebLoginApp application makes a login request that specifies the RyanTravelPhone profile and limits the login time to 60 minutes.	Example 2-2
Login Request	WebLoginApp requests that user rknotts be logged in to the specified device for an unlimited duration.	Example 2-3
Logout Request	The 7960LoginApp application requests that the current user be logged out of device SEP003094C25B15.	Example 2-4
Request Response	Response of Success to a login or logout request displays.	Example 2-5
Request Response	Failure response with error indicates an incorrect appID or password.	Example 2-6
Device-User Query	Query asks what user is logged in to device SEP003094C25B15.	Example 2-7
User-Devices Query	Query asks to which devices user rknotts and fwragge are logged in.	Example 2-8

Table 2-1   Message Examples (continued)

Message Example Type	Description	Example Reference
Device-User Response	Response displays that rknotts is the user who is logged in to device SEP003094C25B15.	Example 2-9
User-Devices Response	Response displays that rknotts is logged in to devices SEP003094C25B15 and SEP003094C25B49, and fwragge is logged in to device SEP003094C25B46.	Example 2-10

Request Examples

Request examples demonstrate three different login requests and one logout request. The login requests show a simple login message and two that specify options like using a particular device profile or setting a login duration.

Example 2-1   Simple Login Request

```
<request>
 <appInfo>
   <appID>7960LoginApp</appID>
   <appCertificate>password</appCertificate>
 </appInfo>
 <login>
   <deviceName>SEP003094C25B15</deviceName>
   <userID>rknotts</userID>
 </login>
</request>
```

Example 2-2   Login Request That Specifies a Profile and a Time Restriction

```
<request>
 <appInfo>
   <appID>WebLoginApp</appID>
```

```
    <appCertificate>password</appCertificate>
  </appInfo>
  <login>
   <deviceName>SEP003094C25B15</deviceName>
   <userID>rknotts</userID>
   <deviceProfile>RyanTravelPhone</deviceProfile>
   <exclusiveDuration>
     <time>60</time>
   </exclusiveDuration>
  </login>
</request>
```

Example 2-3   Login Request That Specifies an Unlimited Duration

```
<request>
 <appInfo>
   <appID>WebLoginApp</appID>
   <appCertificate>password</appCertificate>
 </appInfo>
 <login>
   <deviceName>SEP003094C25B15</deviceName>
   <userID>rknotts</userID>
   <exclusiveDuration>
     <indefinite/>
   </exclusiveDuration>
 </login>
</request>
```

Example 2-4   Logout Request

```
<request>
```

```
<appInfo>
  <appID>7960LoginApp</appID>
  <appCertificate>password</appCertificate>
</appInfo>
<logout>
  <deviceName>SEP003094C25B15</deviceName>
</logout>
</request>
```

Request Response Examples

The request response examples show a success message (for either login or logout) and a failure message that indicates the type of error that the login or logout attempt generated.

Example 2-5   Success Response

```
<response>
  <success/>
</response>
```

Example 2-6   Failure Response

```
<response>
  <failure>
    <error code="3">Could not authenticate 'appid'</error>
  </failure>
</response>
```

Query Examples

Query examples show a typical Device-User Query message and a typical User-Devices Query message that an application sent to the Cisco Extension Mobility service.

Example 2-7   Device-User Query

<query>

 <appInfo>

  <appID>applicationName</appID>

  <appCertificate>password</appCertificate>

 </appInfo>

 <deviceUserQuery>

  <deviceName>SEP003094C25B15</deviceName>

 </deviceUserQuery>

</query>

Example 2-8   User-Devices Query

<query>

 <appInfo>

  <appID>applicationName</appID>

  <appCertificate>password</appCertificate>

 </appInfo>

 <userDevicesQuery>

  <userID>rknotts</userID>

  <userID>fwragge</userID>

 </userDevicesQuery>

</query>

Query Response Examples

Query Response examples show messages that the Cisco Extension Mobility service sent to the login application after the login application has sent a Device-User query message or a User-Devices query message.

Example 2-9   Device-User Response

```
<results>
 <deviceUserResults>
  <device name="SEP003094C25B15">
   <userID>rknotts</userID>
  </device>
 <deviceUserResults>
</results>
<results>
```

Example 2-10   User-Devices Response

```
 <userDevicesResults>
  <user id="rknotts">
   <deviceName>SEP003094C25B15</deviceName>
   <deviceName>SEP003094C25B49</deviceName>
  </user>
  <user id="fwragge">
   <deviceName>SEP003094C249A6</deviceName>
  </user>
 </userDeviceResults>
</results>
```

Login Service Error Codes

Table 2-2 shows the current error codes that the Cisco Extension Mobility Login service returns and describes what each error code means.

Table 2-2   Cisco Extension Mobility Login Service Error Codes

Error Code	Description
0	Unknown Error
1	XML Validation Error: Because the request or query was incorrectly formed, it cannot be properly processed.
2	Authentication Error: An error occurred in the authentication process, and the validity of the appID and appPassword that were submitted cannot be confirmed.
3	Invalid Authentication: The appID and/or appPassword that were provided are incorrect.
4	Policy Validation Error: Some generic issue exists regarding determination whether the request is allowed.
5	Request Denied: The request has been denied (failed Policy Validation) for one or more reasons.
6	Database Error: The Extension Mobility service received an error while trying to communicate with the database.
7	AutoLogout Setup Error: The system could not communicate with the AutoLogout service.
8	Query Type Unknown: The system could not determine whether the query is Device-User or User-Devices.
9	DirUser Creation Error: Directory integration error occurred.
10	Proxy Authentication Not Allowed: the appID that is specified does not have rights to log in or log out other users.
11	Device Does Not Exist: The specified device for login or logout does not exist in the system.
12	Device Profile Does Not Exist: Either a profile was specified that does not exist or no Logout Device Profile was configured for the specified user.

Table 2-2   Cisco Extension Mobility Login Service Error Codes (continued)

Error Code	Description
18	Device Already Logged In: The system could not log in to the specified device because a user is already logged in.
19	Device Not Logged In: Could not log out of the specified device because no user is logged in.
20	Get Device Hoteling Flag Error: The system could not determine whether the device allows Cisco Extension Mobility (also called "hoteling").
21	Get Device Hoteling Status Error: The system could not determine whether these is a user currently is logged in.
22	Device Does Not Allow Extension Mobility: The device that is specified is not configured for Extension Mobility.
23	User Does Not Exist: The userID that was entered for login does not exist in the system.
25	User Already Logged In Elsewhere: The system denied the0 login because the specified user is already logged in to a different device.