SESM Web Development Overview

This chapter provides an overview of a Cisco Subscriber Edge Services Manager (Cisco SESM) system and a Cisco SESM web application. It also provides a high-level look at the web components and techniques used to develop a Cisco SESM web application.

Cisco SESM System

Cisco SESM is part of a Cisco solution that allows subscribers of DSL, cable, wireless, and dial-up to simultaneously access multiple services provided by different Internet service providers, application service providers, and Corporate Access Servers.

Cisco SESM allows a service provider to create a customized web application that provides a network portal for individual subscribers. Through the Cisco SESM's web-based network portals, subscribers can have simultaneous access to the Internet, corporate intranets, gaming, and other entertainment-based services. After logging on and being authenticated to the system, subscribers access their own personalized services by pointing and clicking.

Depending on the SESM software that is used, a deployed SESM web application can be configured for one of two modes:

- *RADIUS mode*—Service and subscriber information is stored in a RADIUS server.
- *DESS mode*—Service, subscriber, and policy information is stored in an LDAP-compliant directory, which is accessed with the Directory Enabled Service Selection (DESS) application programming interfaces of Cisco Subscriber Policy Engine (SPE).

A Cisco SESM web application allows subscribers to:

- Select or deselect services to which they are subscribed
- Subscribe to or unsubscribe from services they are authorized to access (DESS mode only)
- Change account details, such as address information and passwords (DESS mode only)
- Create subaccounts for other family members (DESS mode only)
- View the status of service connections
- View system messages

A Cisco SESM system includes one or more SESM servers running one or more Java 2 Enterprise Edition (J2EE) web servers.

The Cisco SESM system components (Figure 1-1) include the Cisco Service Selection Gateway (SSG), a software module that runs in a node route processor (NRP) router blade on a Cisco 6400 universal access concentrator (UAC).

Figure 1-1 shows an SESM system that includes the components for an LDAP-compliant directory implementation.

- RDP (RADIUS-DESS Proxy) is a proxy server that uses the DESS class libraries to translate RADIUS into Lightweight Directory Access Protocol (LDAP) so that service and subscriber information in an LDAP-compliant directory can be accessed.

- CDAT (Cisco Distributed Administration Tool) is a web-based facility for creating and maintaining service and subscriber information in an LDAP-compliant directory.

Figure 1-1   SESM System Components
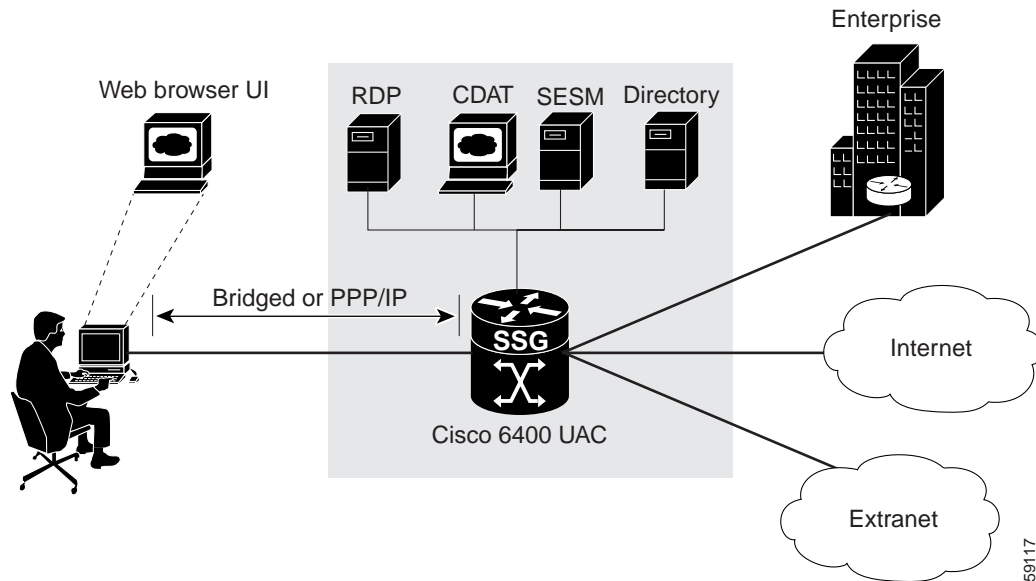
For detailed information on SESM system components, see the *Cisco Subscriber Edge Services Manager and Subscriber Policy Engine Installation and Configuration Guide*.

Cisco SESM Web Applications

A Cisco SESM *web application* is a collection of associated web resources that can include JavaServer Pages (JSP), servlets, utility classes, static documents (such as HTML or WML files), images, and other data. An SESM web application includes:

- A business model of the relationship between subscribers and services. In DESS mode, the business model supports service selection, service subscription, subscriber self-care, and service and subscriber management.

- Components that allow the SESM business model to communicate with other system components such as an SSG, a RADIUS AAA server, and an LDAP-compliant directory.

- Components for internationalization and localization of an SESM web application.

- Development guidelines that allow an SESM web application to be deployed and configured in the context of a J2EE web server.

The Jetty web server from Mortbay.com is installed with the SESM software—though a Cisco SESM web application can be deployed with any J2EE-compliant web server. From a development perspective, a Cisco SESM web application has three tiers:

- Web client tier—The subscriber accesses the SESM user interface through a web browser.
- J2EE web server tier—A set of JSP pages and Java servlets receives requests from the web client, processes the requests by communicating with back-end components, and renders and sends a reply to the client.
- Back-end tier—One or more data repositories (such as a RADIUS authentication, authorization, and accounting (AAA) server or an LDAP directory) store service and subscriber information.

Figure 1-2 illustrates this three-tiered perspective.

Figure 1-2   Three-tiered SESM Web Application
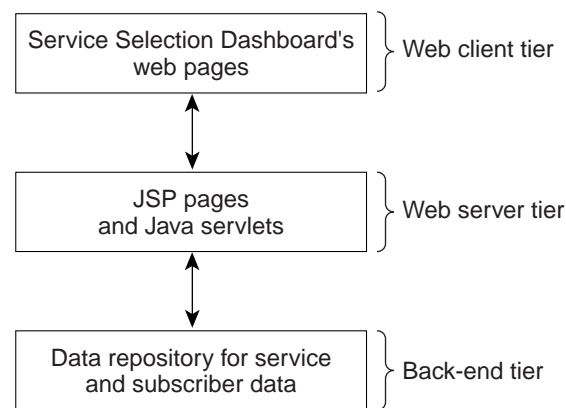
The interactions between an SESM web application and the back-end components are implemented with a set of specialized SESM programming interfaces. Currently, these interactions are preprogrammed in the JSP pages and configurable by the SESM deployer. Because these pieces of the web-application software do not require programming by the service-provider's developer, SESM web development can be completed in a much shorter period of time.

For the service provider, SESM web development involves two distinct roles:

- Web designer—Responsible for the HTML or WML design: the look, branding, and organization of the web site.
- Web developer—Responsible for integrating the HTML or WML design with the SESM web components using JSP pages.

The SESM software provides components and techniques for the customization and localization of the web pages. The web designer and web developer determine what customization is needed and use the SESM components and techniques to render the pages in the required manner.

Sample Cisco SESM Web Application

A complete sample Cisco SESM web application is included with the SESM software: New World Service Provider (NWSP). The NWSP web application gives the web developer a fully functional set of SESM web components that demonstrate much of what can be done in an SESM web application. The NWSP sample web application can also be used as the basis for creating a web application that meets the service provider's branding, look-and-feel, and other requirements.

Conventional Web Sites: A Problem

Most conventional web sites on the World Wide Web are structured in a manner that works well as long as certain assumptions about the user are met. For example, the user:

- Has a PC running Microsoft Windows.
- Has a browser that is a recent version of Microsoft Internet Explorer or Netscape Navigator.
- Understands English (with American spelling).

In the past, these assumptions were true for most users of conventional web sites.

Today, web-based interfaces must accommodate more variety on the World Wide Web in the form of:

- Diversity of devices including PCs, handheld computing devices, and smart phones
- Diversity of bandwidths and software technologies such as HTTP and WAP
- Diversity of markup languages including HTML, HDML, XML, and WML
- Diversity of languages and cultures

Sometimes it is required that the same information or services be provided to the same subscriber with a variety of applications, devices, and locales.

Customer circumstances such as the device, bandwidth, and language are outside of the control of the web site. Other customer characteristics are imposed by the web site itself. Is this a new or existing customer? With which brands is the web site associated? What level of service has the customer selected?

The problem with conventional web sites is that they cannot adapt their content and format to the variety of user characteristics that are currently on the web.

SESM Technology: A Solution

The set of characteristics (for example, device, brand, and locale) that define a subscriber is called the user's *shape*. The web components, directory hierarchy, and infrastructure of a Cisco SESM web application are designed to provide an SESM network portal that is customized for each user's shape.

Because an SESM web application is designed to detect and adapt to each user's shape, the Cisco SESM network portal can provide customer-tailored content and service offerings as well as a high degree of brand identity. As an example, an SESM web application can identify the location of the subscriber and provide location-specific pages and service offerings.

How does the Cisco SESM dynamically adapt to the user's shape? There are a number of possible strategies for providing customized content:

- Strategy 1—Make the existing web pages adapt for different types of users.
- Strategy 2—Create a separate set of web pages for each type of user.
- Strategy 3—A combination of strategy 1 and strategy 2.

Strategy 1 can make web pages complex, error prone, and difficult to maintain. For example, the presentation of a web page targeted for a Personal Digital Assistant (PDA) is different from the presentation of the same page targeted for a PC. These size differences often require dynamic HTML scripting to accommodate the differences in page content and layout. Implementing and maintaining these pages can be difficult.

Strategy 2 is often used when there is a requirement to support multiple languages. The entire web site is copied, and one language is replaced with another. For example, an English-language web site might be copied, and the English-language elements including text, currency symbols, formats of dates, and formats of numbers are replaced with Japanese-language elements. The end result is one web site for each language that is supported.

Strategy 2 ignores the commonality of elements on the multiple sets of web pages. As an example, the company logo might be the same on the pages in each web site but would need to be included in the set of resources in each web set. With strategy 2, when you change the logo on one web site, the change has to be replicated on the other web sites. This approach is time-consuming and error prone.

If you need to support English, Japanese, and Spanish, and desktop PCs, color PDAs, and monochrome PDAs, both strategy 1 and strategy 2 become more complicated. Strategy 1 requires complex dynamic HTML techniques, and strategy 2 requires nine separate web sites.

Strategy 3 is the approach to user customization that a Cisco SESM web application takes. This approach combines the most useful aspects of strategy 1 and strategy 2 while it attempts to minimize the drawbacks of both techniques. The web components, directory hierarchy, and infrastructure of a Cisco SESM web application provide easy-to-use mechanisms for customizing web content and format based on each user's shape.

- SESM web components—The SESM web components are designed so that they can be easily changed to meet the service provider's branding and look-and-feel requirements. The SESM web components include:
  - Easy-to-customize JSP pages
  - Templates and library items that allow an entire set of web pages to be updated when a template or library item is changed
  - Images and icons that are shipped with the native image-editor source files so they can be quickly modified

- SESM directory hierarchy—The SESM web application uses a *sparse tree directory structure*. With a sparse tree directory structure, though some web site resources may exist in more than one location (as in strategy 2), the need for multiple copies of the same resource is greatly reduced.

- SESM web application infrastructure—The SESM web application includes Java servlets, JSP pages, and specially designed Java classes that allow the SESM web site to be customized and localized for each subscriber.

For detailed information on each of the preceding elements of the SESM web application, see Chapter 2, "SESM Components and Techniques."

Hardware and Software Requirements for Development

On the development machine, the following software must be installed and set up correctly:

- Cisco SESM Release 3.1(1)
- Java 2 SDK, Standard Edition, Version 1.2.2 or later, which is available for downloading at:

  `http://java.sun.com/products/jdk/1.2/index.html`

The other hardware and software requirements for SESM web development include the same requirements that apply to deploying an SESM web application except that no separate Java Runtime Environment (JRE) is required if the Java 2 SDK is installed. For information on these requirements and how to install and configure the software, see the *Cisco Subscriber Edge Services Manager Installation and Configuration Guide*.

The development machine must have a J2EE-compliant web server installed and set up correctly. The Jetty web server is included with the SESM software. For information on installing and configuring a web server, refer to the instructions that apply to your web server.

Demo Mode

You can install or configure the SESM software for demonstration mode to observe how the NWSP web application works. Demonstration mode is also useful during some phases of web-application development because this mode does not require other system components such as a configured Cisco 6400 UAC and SSG. For more information on demonstration mode, see the "Demo Mode" section on page 2-24.

Environment Variables

The installation instructions for the Java 2 SDK describe how to set the required environment variables. For information on where to find the installation instructions, see the README file that is installed with the Java 2 SDK. Before you start Cisco SESM web development, check that the environment variables shown in Table 1-1 are set to the indicated locations.

Table 1-1   Java 2 SDK Environment Variables

Environment Variable	Value
JDK_HOME	The location of the Java 2 SDK Standard Edition installation if that SDK is used.
PATH	The location of the `bin` directory of the Java 2 SDK installation (for example, C:\jdk1.2.2\bin). This allows you to run the SDK executables from any directory.

If you use the CLASSPATH environment variable to tell the Java compiler where to find SESM-related class files, you need to set CLASSPATH to the location of these files. For information on the class libraries needed for compiling an SESM web application, see the "SESM Class Libraries" section on page 2-23.

Recommended Development Tools

The Cisco SESM software includes web components that were developed with Dreamweaver UltraDev 4, a visual editor for creating and managing web sites and pages, and Fireworks 4, a Web graphics design and production facility. We recommend these two state-of-the-art tools for SESM web development because with them the developer can create a customized SESM web application more quickly and easily.

Neither Dreamweaver UltraDev nor Fireworks is required to develop an SESM web application. However, you can more easily modify some SESM web components using Dreamweaver UltraDev and Fireworks. SESM web components that require Dreamweaver UltraDev and Fireworks include:

- Dreamweaver templates for creating and modifying page layout and appearance
- Dreamweaver library items for frequently reused images, text, and other objects
- Fireworks buttons with preprogrammed rollover behaviors

SESM images and icons are provided in Portable Networks Graphics (PNG) format so they can be easily customized in Fireworks. Image editors other than Fireworks may be limited in their ability to edit these PNG-formatted images and icons.

For information on Dreamweaver UltraDev 4 and Fireworks 4, see the Macromedia web site at:

```
http://www.macromedia.com
```

Both Dreamweaver UltraDev 4 and Fireworks 4 are available at the web site for a free 30-day evaluation.

Learning about SESM Web Application Development

The web developer should become familiar with the SESM components and techniques by reading this document and experimenting with a sample SESM application such as NWSP. Table 1-2 lists some topics with which the developer should be familiar.

Table 1-2   SESM Web Development Reading Path

For information on this topic	Read this Chapter or Section
Overview of SESM components and techniques	Chapter 1, "SESM Web Development Overview"
Using the SESM web components	"Using SESM Web Components" section on page 2-1
Customizing an SESM web application's look and feel	"Customizing an SESM Web Application" section on page 2-4
Rendering SESM web pages to match the user's shape	"Using a Sparse Tree Directory Structure" section on page 2-6 and "Using the Decorator Components" section on page 2-12
Developing an SESM web application	"Developing an SESM Web Application" section on page 2-22
Using the sample SESM web application components	Chapter 3, "New World Service Provider Web Application"
Internationalizing and localizing an SESM web application	Chapter 4, "SESM Internationalization and Localization"

For information on J2EE, web application development, and JSP pages, the web provides many resources including the Java Developer Connection at http://developer.java.sun.com/developer. Two recommended resources are:

- The book *Core Servlets and JavaServer Pages* (by Marty Hall, Sun Microsystems Press, 2000) is an excellent resource for learning about JSP pages.

- The *Java Servlet Specification* (Sun Microsystems, Inc., 2000) has some useful general information on web applications and other related topics. The PDF file containing the specification is at:

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http://java.sun.com/aboutJava/communityprocess/first/jsr053/servlet23_PFD.pdf
```

Java Servlet or JSP class library documentation is available in the /doc directory at the Java 2 SDK installation location.

If you plan to use Dreamweaver UltraDev or Fireworks as development tools and are not familiar with their use, those facilities have their own documentation, Help systems, and web resources. Some Dreamweaver templates in the NWSP sample web application use Fireworks 4 with Dreamweaver. A tutorial on using Fireworks and Dreamweaver together to edit web pages and graphics is at:

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http://www.macromedia.com/support/fireworks/programs/fw_dw_tutorial
```