Basic Concepts

This section describes the concepts of network and service management associated with the Cisco 6400 UAC using CEMF. It describes the basic concepts of CEMF (for further information, refer to the *CEMF User Guide*). The CEMF commands, icons and menus that access services on the Cisco 6400 SCM are described, with examples of the containment trees and services.

Figure 2-1 Cisco 6400 UAC Installation

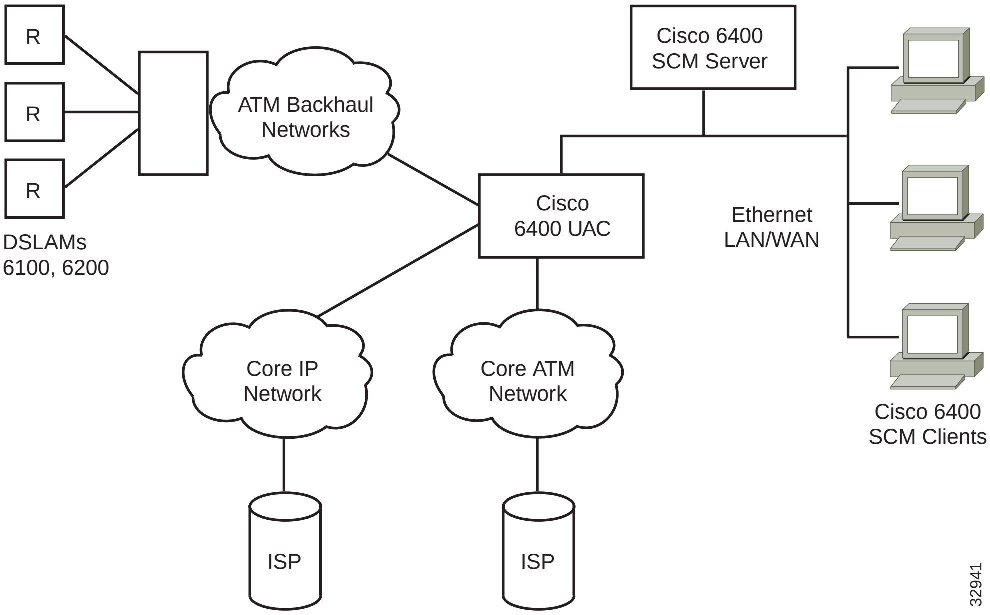


Figure 2-1 shows a typical installation of the Cisco 6400 UAC located within the service provider’s infrastructure and acting as a central point of control.

Cisco 6400 SCM

The Cisco 6400 SCM software has two distinct components: Element Management and Service Connection Management.

Element Management

An Element Manager is an application which is responsible for providing FCAPS management for a particular type of network element or family of network elements.

Element managers integrate seamlessly with generic CEMF applications such as maps and event browsers.

Element Management consists of FCAPS and Operations, Administration, Maintenance and Provisioning (OAM&P) features and presents you with a more detailed view of the underlying network elements.

Refer to the “Managing the Element Manager Windows” chapter on page 4-1 for further details.

Service Connection Management

Service Connection Management can create and configure subscribers and services and manage resultant subscriber/services connections. Performing these functions does not require an understanding of the details of the underlying network elements.

Refer to the “Service/Subscriber Provisioning” chapter on page 6-1 for further details.

Starting the Cisco 6400 SCM Application

CEMF User Session

You must start a CEMF user session before you can start the 6400 SCM application.

Note Each active CEMF session requires a single CEMF User License.

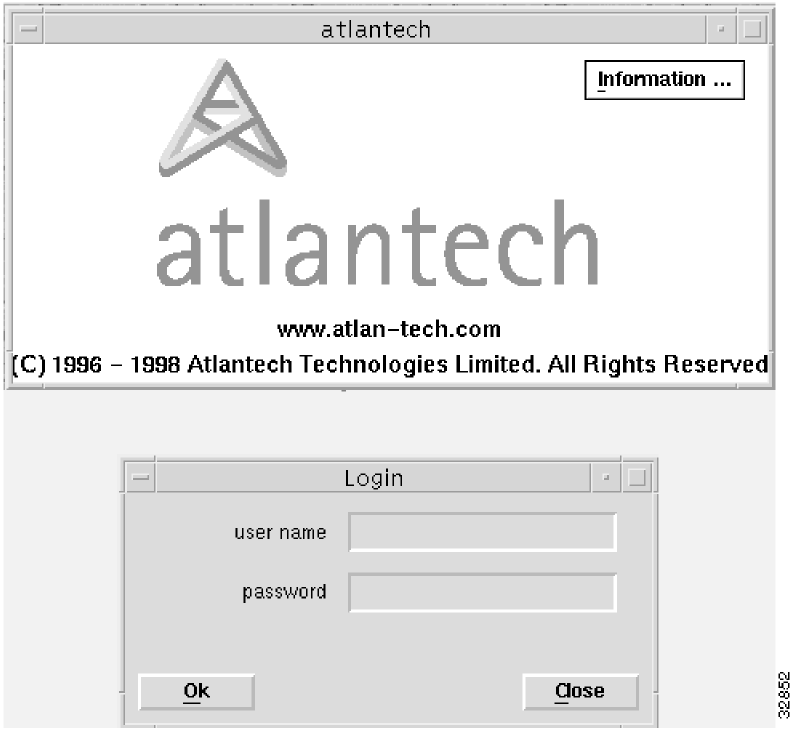
To start an CEMF user session, proceed as follows:

Step 1 From the command line on the terminal window type **<CEMFROOT>/bin/cemfsession**

Note **<CEMFROOT>** is the CEMF installation root directory (by default, **/opt/cemf**).

The Login window appears.

Figure 2-2 **Login Window**



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Note Obtain a valid user name and password from your system administrator.

Step 2 Enter your **user name** and **password**. The default **user name** and **password** are **admin**.

Step 3 Click **OK**.

Note You are allowed three attempts to enter a valid **user name** and **password** combination.

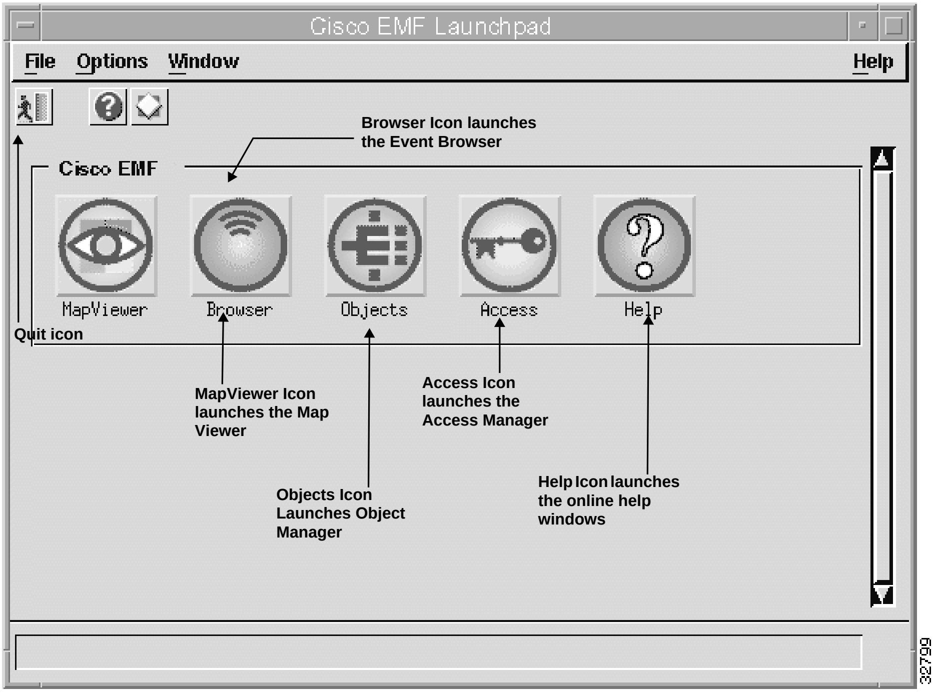
The **CEMF Launchpad** (shown in Figure 2-3) appears when a valid **user name** and **password** combination are entered.

CEMF Launchpad

The icons in the CEMF frame on the launchpad represent tools that are provided by this CEMF installation (for further information on the CEMF Launchpad, refer to the *CEMF User Guide*). Extra icons may appear when additional packages are installed. These icons appear in a frame identified by the package name.

The icons (shown in Figure 2-3) represent the standard CEMF tools. Click on the corresponding icon to launch an CEMF tool.

Figure 2-3 CEMF Launchpad


Cisco EMF Launchpad
File
Options
Window
Help
Cisco EMF
MapViewer
Browser
Objects
Access
Help
Browser Icon launches the Event Browser
Quit icon
MapViewer Icon launches the Map Viewer
Access Icon launches the Access Manager
Objects Icon Launches Object Manager
Help Icon launches the online help windows
32799

The **Map Viewer** displays a graphical representation of the selected Cisco 6400 chassis.

Viewing the 6400 SCM Chassis Map

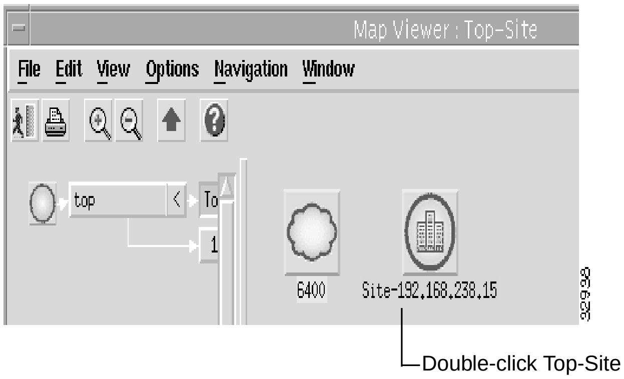
The 6400 SCM chassis map shows a graphical representation of the 6400 UAC.

To view the chassis map for a selected site, proceed as follows:

Step 1 Click **Map Viewer** s (shown in Figure 2-3) on the CEMF Launchpad.

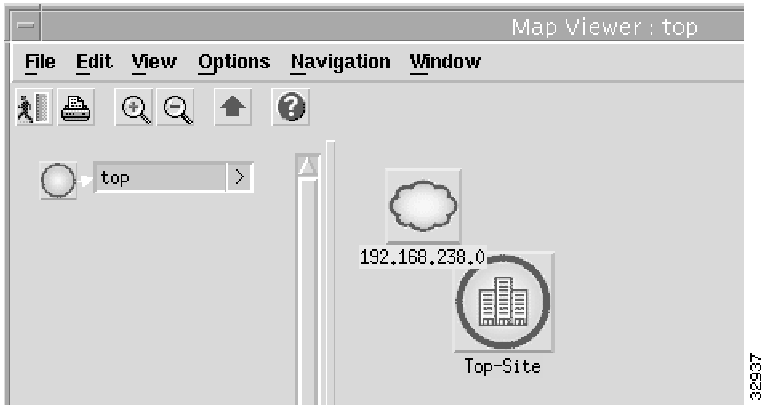
Step 2 The Map Viewer Top window appears. Double-click on **Top-Site** in the right-hand frame.

Figure 2-4 Map Viewer: Top-Site Window



Step 3 Double-click on the selected site (**Site-192.168.238.15**, in the example shown below).

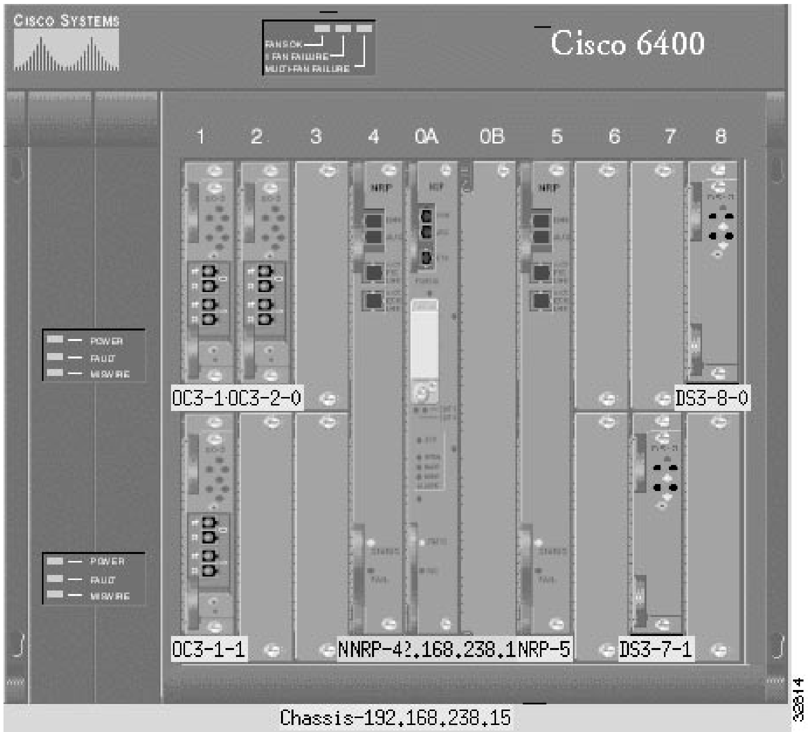
Figure 2-5 Map Viewer: Top-Site Window



The **Map Viewer** window shows a graphical representation of the Cisco 6400 chassis for the selected site.

Note Right-click on any card/module to access additional menus.

Figure 2-6 Cisco 6400 SCM Chassis Map



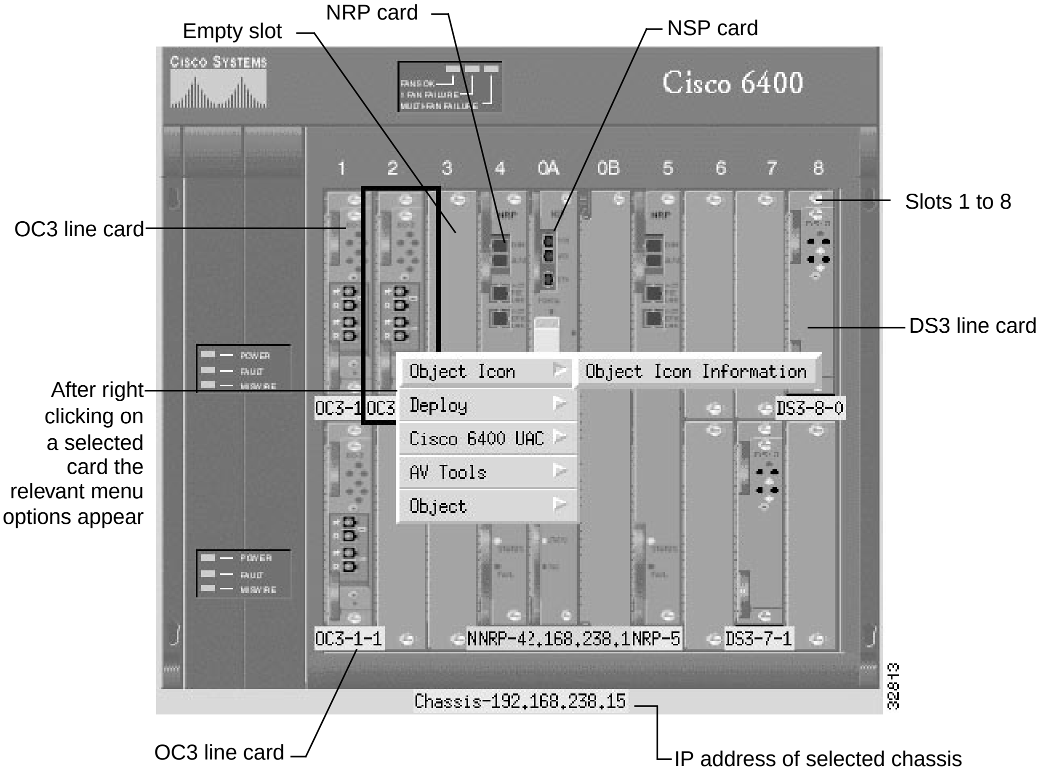
Each card in the rack has a color-coded box that identifies the card type, its position in the chassis rack, and its current alarm status.

Green is a ‘normal’ state; orange is a major alarm; and blue is a decommissioned (unmanaged) element. For example, in the chassis map shown in Figure 2-6, **DS3-8-0** identifies a DS3 line card (**DS3**) in slot 8 (**8**) occupying the top half sub slot (**0**) of the slot and the green color indicates that the DS3 line card is in its normal state.

Note This naming scheme is only used when the sub-chassis discovery is used. These names can be changed later or you can use your own naming conventions when deploying the cards manually.

Figure 2-7 shows an example of typical line card menus displayed when you right click on the selected line card.

Figure 2-7 Cisco 6400 SCM Chassis Map with Menu



Viewing Cisco 6400 SCM Alarms

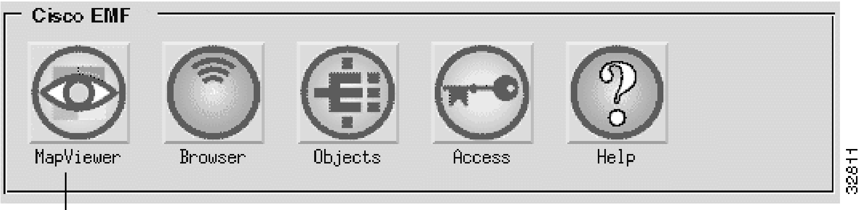
The Cisco 6400 UAC supports a number of alarm sources, including SNMP traps and SNMP alarm tables from Cisco 6400 MIBs. Additionally, a number of event derivations can be made by the Cisco 6400 SCM.

All alarm sources of the Cisco 6400 SCM are displayed in windows, providing an integrated fault management solution.

This section outlines the sources of Cisco 6400 SCM alarm information and shows how these sources are represented within the Cisco 6400 SCM and CEMF applications.

Event Browser Alarms

Event Browser is an application that allows you to view events flagged by the system.



Click Browser to launch the Event Browser

The **Event Browser** displays the following information:

- the time and date at which an event was reported
- the object name that was affected
- a description of the event and the severity of the event

This information appears in a table format. All events are saved within the **Event Browser,** which displays both current and historical data.

All network objects are color-coded reflecting their operational status. Alarms are raised up the element hierarchy according to severity. Table 2-1 identifies alarm types and their associated color codes.

Table 2-1 Alarm Color Codes

Alarm Type	Color
Critical	Red
Major	Orange
Minor	Yellow

You can navigate directly from a single event to the affected object to perform detailed configuration activities.

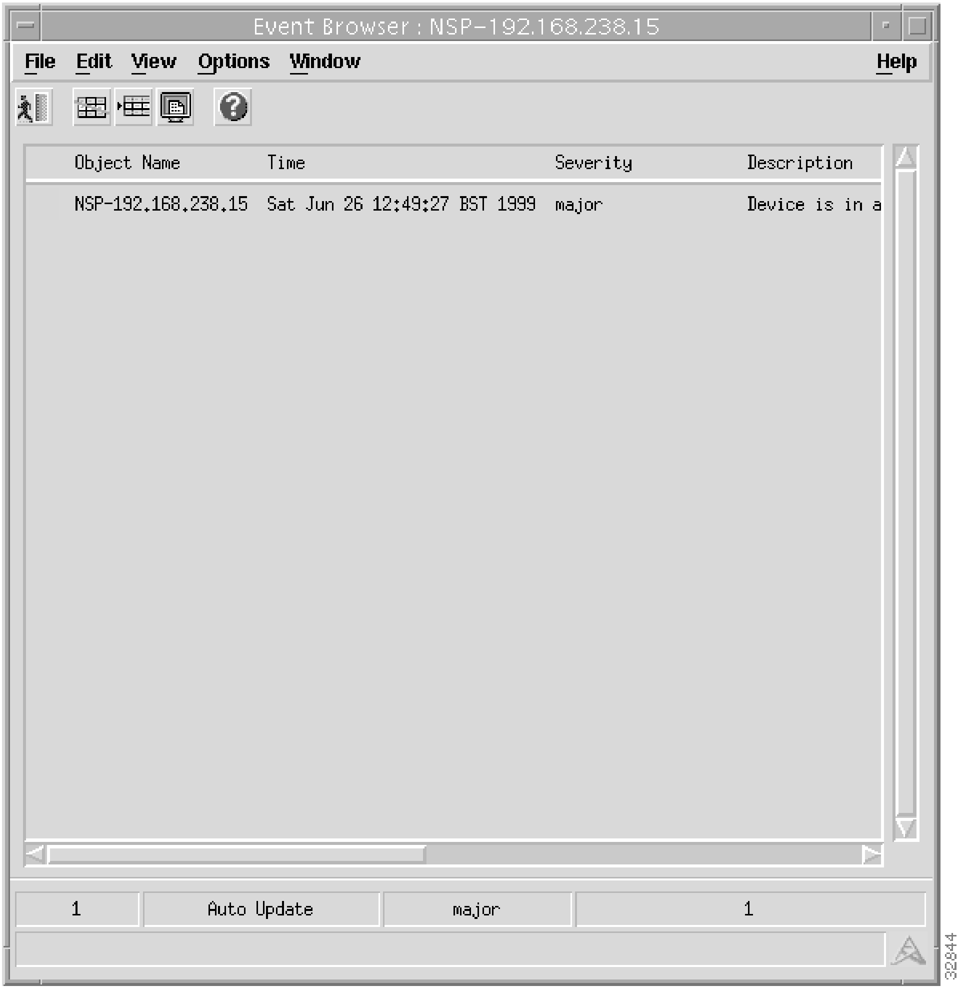
One example of a major (orange) alarm is loss of connectivity to any Cisco 6400 component. This appears as an orange alarm in the **Map Viewer** window. When this occurs, you should go to the **Event Browser** window for details of the alarm.

To view the **Event Browser** window, proceed as follows:

Step 1 Right click on either the object on the relevant chassis in the **MapViewer** window; or, on a map node; or, on an object in the **Object Manager**; or, on an open **Element Management** window from an object pick list.

Step 2 Select the **CEMF Tools**, **Open Event Browser** option.

Figure 2-8 Event Browser Window

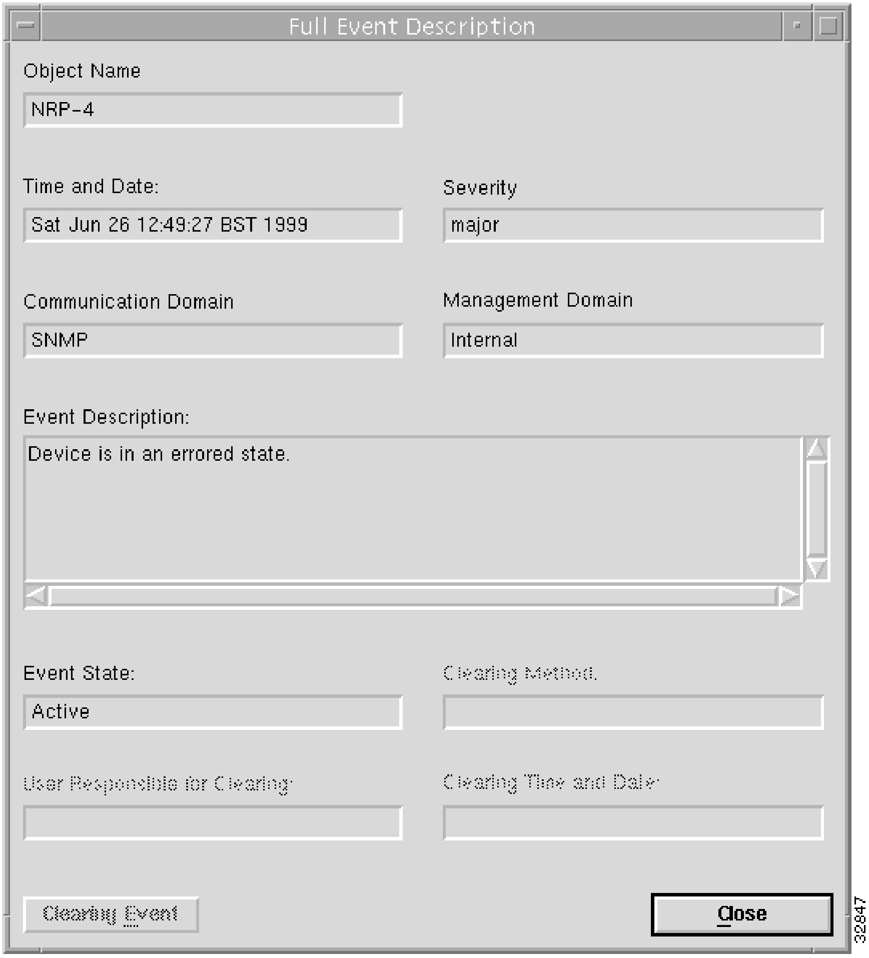


Object Name	Time	Severity	Description
NSP-192.168.238.15	Sat Jun 26 12:49:27 BST 1999	major	Device is in a

The **Event Browser** window identifies the **Object Name**, the **Time** the alarm occurred, the alarm **Severity** and a brief **Description** of the alarm.

For more details, double-click on a selected event to view the **Full Event Description** window.

Figure 2-9 Full Event Description Window



Full Event Description

Object Name: NRP-4

Time and Date: Sat Jun 26 12:49:27 BST 1999

Severity: major

Communication Domain: SNMP

Management Domain: Internal

Event Description: Device is in an errored state.

Event State: Active

Clearing Method:

User Responsible for Clearing:

Clearing Time and Date:

Note If the event has not been cleared, the **Event State** displays Active and the **Clearing Method**, **User Responsible for Clearing**, and **Clearing Time** and **Date** sections are disabled.
The information displayed cannot be altered.
If an event has been cleared, you can view the method used to clear it by clicking the **Clearing Event** button.

The Full Event description window displays the following information:

- **Object name**—name of the Cisco EMF managed object the event was reported against
- **Time and Date**—the time and date the event was reported
- **Severity**—the severity of the reported event
- **Source Domain**—indicates from which Communications domain the event was reported
- **Management Domain**—indicates from which Management domain the event was reported
- **Event Description**—provides a brief description of the reported event

- **Event State**—indicates whether the event is active or cleared. If the event has been cleared, the **Clearing Method**, **User Responsible for Clearing**, and **Clearing Time and Date** sections become active.

Acknowledge Details

- **User**—identifies the user who acknowledged the event
- **Time and Date**—identifies when the event was acknowledged.

Clearing Details

- **Clearing Method**—indicates if the event was cleared by the network or by a user
- **User Responsible for Clearing**—displays the user name responsible for clearing the event
- **Clearing Time and Date**—indicates the time and date the event was cleared
- **Reason for clearing**—the information that was entered in the Events Clearing window, which is completed when the **Clear** indicator is selected.

Step 3 Click **Close** to exit the **Full Event Description** window.

Step 4 Click **Close** to exit the **Event Browser** window.

Refer to the *CEMF User Guide* for further information on **Event Browser**.

Event Manager

Additionally, the Cisco 6400 SCM can be complemented by the addition of the CEMF Event Manager application. This application enables you to set thresholds, monitoring any supported Cisco 6400 SCM MIB variable (that is, those which appear on the Cisco 6400 SCM windows). One example of a supported Cisco 6400 SCM MIB variable is the “total connections” variable, which details the number of connections currently existing at the specified ATM port. With the CEMF Event Manager, you can set up a polling regime to periodically check the value of the total connections variable. When the total connections variable exceeds a user-defined limit (as specified in the threshold regime), the CEMF Event Manager raises a CEMF event against the relevant ATM port. This event appears in the **Map Viewer** and **Event Browser** and can be sent to a pager, by trouble ticket or e-mail message (as appropriate) through the Event Manager “Notification” facility, thereby providing an automated capacity and resource management application for the Cisco 6400 UAC.

Traps

The Cisco 6400 SCM software processes four traps sent from the Cisco 6400 UAC hardware:

1. Cisco6400ChassisChangeNotification — raised when a 6400 component (such as an NRP) fails or is pulled out for various reasons (for example, a hot swap component change). This trap stimulates chassis rediscovery and ensures that the 6400 Chassis Map accurately reflects the status of the 6400 components.
2. Cisco6400ChassisFailureNotification — raised on Power Supply Units (PSUs), fan or chassis temperature failure to show an event condition against the appropriate 6400 component. This trap facilitates simpler problem diagnosis and stimulates chassis rediscovery.

3 LinkUp — signifies that the SNMPv2 entity, acting in an agent role, has detected that the ifOperStatus object for one of its communication links left the down state and changed into some other state (but not into the notPresent state). This other state is indicated by the included value of ifOperStatus.

4 LinkDown — signifies that the SNMPv2 entity, acting in an agent role, has detected that the ifOperStatus object for one of its communication links is about to enter the down state from some other state (but not from the notPresent state). This other state is indicated by the included value of ifOperStatus.

Table 2-2 shows mapping between the alarms raised in the chassis alarm table and the traps that are dispatched from the Cisco 6400 UAC. For a simple integrated fault management solution, the SCM uses mapping to raise alarms on CEMF objects.

Table 2-2 Chassis Alarm And Trap Mapping

Alarm	Trap
coreTemp	ChassisFail
inletTemp	ChassisFail
totalFanFail	ChassisFail
partialFanFail	ChassisFail
fanMissing	ChassisFail
pem0Fail	ChassisFail
pem1Fail	ChassisFail
sonetLineFail	linkUp / linkDown
cardOIRAlarm	ChassisChange
cardFail	ChassisChange
cardPartialFail	ChassisChange

Alarms from Cisco 6400 SNMP Tables

The Cisco 6400 SCM uses both traps (detailed in Table 2-2) and the alarms raised in the chassis alarm table sent from the Cisco 6400 UAC to raise event conditions against the appropriate Cisco 6400 component. Alarms on the **Faults** tab in the Cisco 6400 Chassis Management window are represented explicitly against each object on which they occur. This allows any problems that exist involving the chassis/NSP, NRP, line card or ATM port objects to be quickly identified by the change of color severity.When an alarm exists its color severity is either yellow (indicating a minor alarm), orange (indicating a major alarm), or red (indicating a critical alarm). Full alarm descriptions can then be viewed using **Event Browser**.

Alarms that occur on physical objects are raised on the objects in the Cisco 6400 SCM as they occur. Similarly, as the alarm condition on the physical object is cleared, then the alarm against the object is cleared both in the **Event Browser** and by the color severity.

Note In order for alarms to be raised and cleared as intended, the Cisco 6400 NSP hardware must be configured to send SNMPv1 traps to your management station.

The Cisco 6400 also stores alarm information in SNMP tables. Because CEMF is based on a protocol-independent event model, these alarm conditions are presented to you in the same manner as SNMP traps.

The following table shows the alarm conditions available from the Cisco 6400 SNMP tables:

Table 2-3 SNMP Alarms

Alarm Message	Alarm Description	Relevant Objects
coreTemp	Core Temperature Limit	NSP
inletTemp	Inlet Temperature Limit	NSP
totalFanFail	Total Fan Failure	NSP
partialFanFail	Fan Tray Failure	NSP
fanMissing	Fan Missing	NSP
pem0Fail	Power Module 0 Failure	NSP
pem1Fail	Power Module 1 Failure	NSP
sonetLineFail	Sonet Line Failure	ATMPort
cardOIRAlarm	Card OIR Alarm for wrong type insertion or removal.	NSP, NRP, LineCard
cardFail	Card failure alarm for non-redundant card failure or redundant primary card.	NSP, NRP, LineCard
cardPartialFail	Card failure alarm for redundancy secondary card failure.	NSP, NRP, LineCard

Note There are other alarms which may be raised against the ATM port which currently have no corresponding message string.

These alarms are available through the CEMF **Event Browser** (shown in Figure 2-3), and also through the CEMF **Map Viewer** (shown in Figure 2-3). These applications serve as a single integrated fault management interface for the Cisco 6400 UAC.

CEMF

CEMF is an open carrier class management system, designed to integrate with third party products and proprietary operational support systems.

Many different management protocols, both standards-based and proprietary, are supported by CEMF in a transparent manner. New network devices are managed instantly and new management applications can be quickly developed to meet new requirements.

CEMF systems architecture provides a distributed network management solution designed to manage large-scale networks. CEMF provides the performance required within the logical and physical architecture and provides user interfaces that support the need to perform mass operations to large domains within the overall network. In addition, due to the distributed nature of CEMF, administration tools are provided to 'manage' the management system.

The **Map Viewer** is the primary entry point into the Cisco 6400 system. When the **Map Viewer** is launched, a map is displayed corresponding to the highlighted map icon in the hierarchy pane. You can easily monitor the status of all network elements or abstractions of elements contained within the network and you can launch any additional applications available.

The **Object Manager** is also an entry point into the CEMF system. The **Object Manager** displays objects in hierarchies, allowing you to navigate to other objects so that services can be invoked on an object.

Concurrent Multi-User Support

The Cisco 6400 SCM supports multi-user access. Windows on other workstations are automatically updated to reflect the most recent status changes made to an element by another user when multiple users are present. You can enable or disable these automatic updates.

Additionally, multiple event browsers and map managers can be run on separate client workstations, allowing a number of users to simultaneously monitor the same or distinct portions of the managed network.

All of a user's applications can be run on client workstations that are remote from the server. This means that the load on the server is dependent only on how much data you request from the server. Therefore, the number of users are not limited by the resource footprint of the applications, all of which run on the server.

Multiple User Sessions

You can open multiple user sessions in CEMF. Each user session has access to the tools displayed in the Launchpad. Any changes made in a user session are reflected immediately in all other user sessions.

The CEMF login window restricts user access to the Cisco 6400 SCM based on a pre-set name/password combination defined by the system administrator.

Audit Trail for Log-In

The Cisco 6400 SCM maintains a log-in record of users who access the Element Manager windows. This information is provided as ASCII text files, namely **c6400Manager.audit** and **C6400SSManager.audit**. These files are found in *<AVROOT>*/**logs**.

Maps

A map is a graphical representation of related objects being managed. You can define maps in a hierarchy where each node on a map has a submap. You can view different levels of complexity in the managed network by looking at high level maps or by navigating to submaps which represent lower levels of detail in the managed network.

Nodes and Links

Nodes and links on a map are graphical symbols representing managed or abstracted objects in the network. A node has an iconic representation, while a link has a vector representation. Links can only exist as a connection between two nodes.

Submaps

Nodes and links can have submaps, creating a hierarchy of browsable maps. Top level maps display administrative or physical network domains; submaps display more detail until actual managed elements are represented.

Status

Network nodes display the current alarm status of a represented object. The alarm status of an object reflects the most severe alarm currently active on an object.

Event Propagation

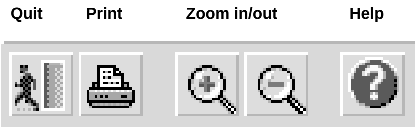
A submap relays the most severe alarm status of all its nodes to the corresponding node on the parent map. The node on the parent map then displays the combined severity of its submap and the node it represents.

This means that you can view a top level map and see the overall status of the entire network. When a node on the map shows a condition or alarm, you can view successive submaps until the source of the condition or alarm appears.

Toolbar

The toolbar at the top of each window contains icons that invoke various tools and menu options. The icons displayed in the toolbar vary depending on which window you are viewing. You can disable the toolbar so that it is not displayed in the window.

Figure 2-10 Toolbar



Tooltips

The tooltips option displays a brief description of each icon. This description will appear when the cursor is left over the icon. Tooltips is enabled by default.

Window Menu

If you want to view which windows you have open, select the **Windows** menu option and all currently open windows will be listed.

Context Sensitive Pop Up Menus

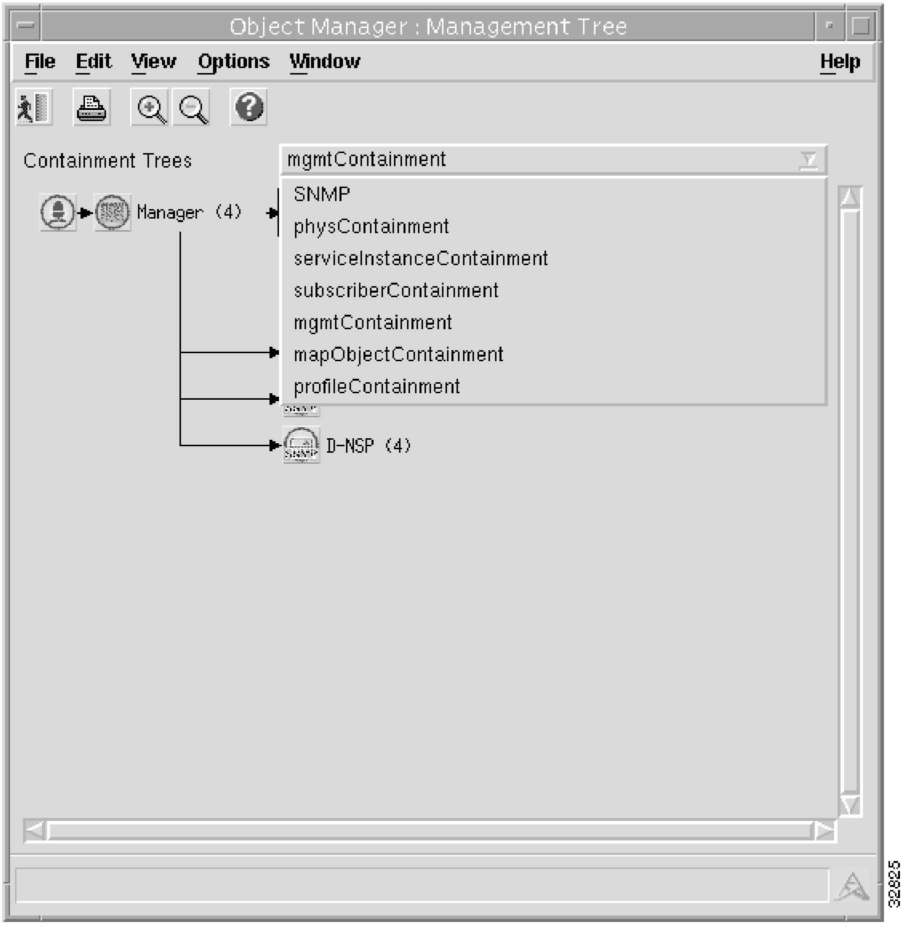
Throughout CEMF you can access pop up menus from map objects, events listed in the **Event Browser**, and objects listed in any containment tree. To access these pop up menus, simply right click on the desired object.

Selecting From Lists

Throughout CEMF you can select either individual or multiple items from lists in the various windows.

Containment

Figure 2-11 Containment Trees



Containment Trees model hierarchical relationships between objects, both physical and logical. Objects are named by **Containment Trees** and can exist in multiple trees simultaneously by reference.

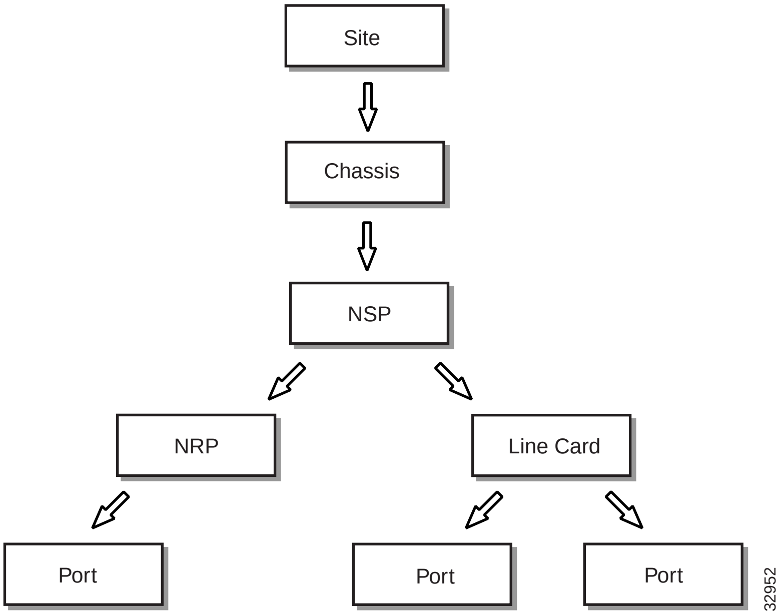
The Cisco 6400 SCM has six types of **Containment Trees**:

1. Physical Containment (**physContainment**)
2. Management Containment (**mgmtContainment**)
3. Map Object Containment (**mapObjectContainment**)
4. Service Instance Containment (**serviceInstanceContainment**)
5. Subscriber Containment (**subscriberContainment**)
6. Profiles Containment (**profileContainment**)

Note SNMP containment and network containment are used internally by the Cisco 6400 SCM.

Physical Containment

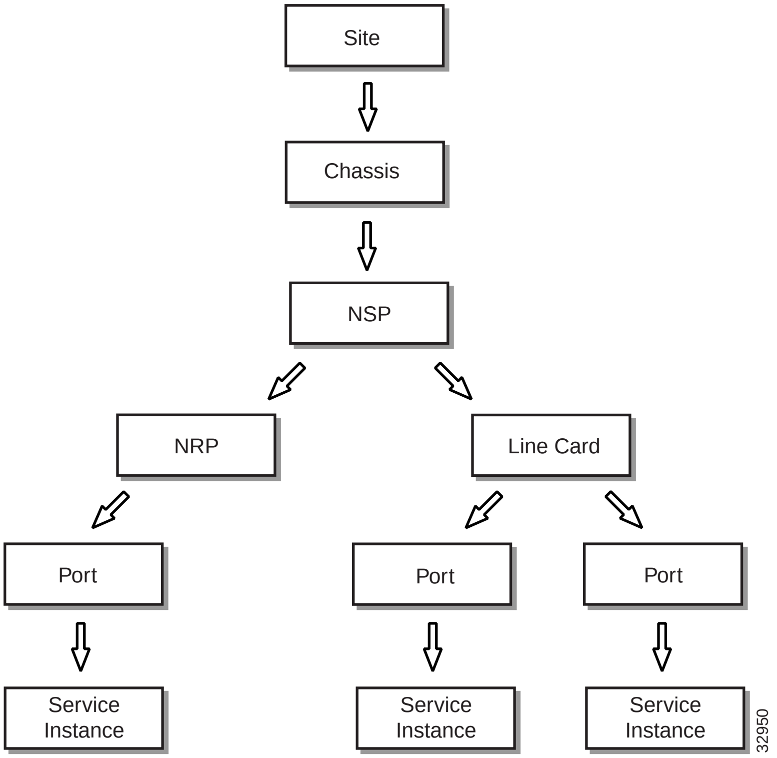
Figure 2-12 Physical Containment Tree



The physical containment reflects the physical relationship of objects and provides relevant information to draw maps.

Management Containment

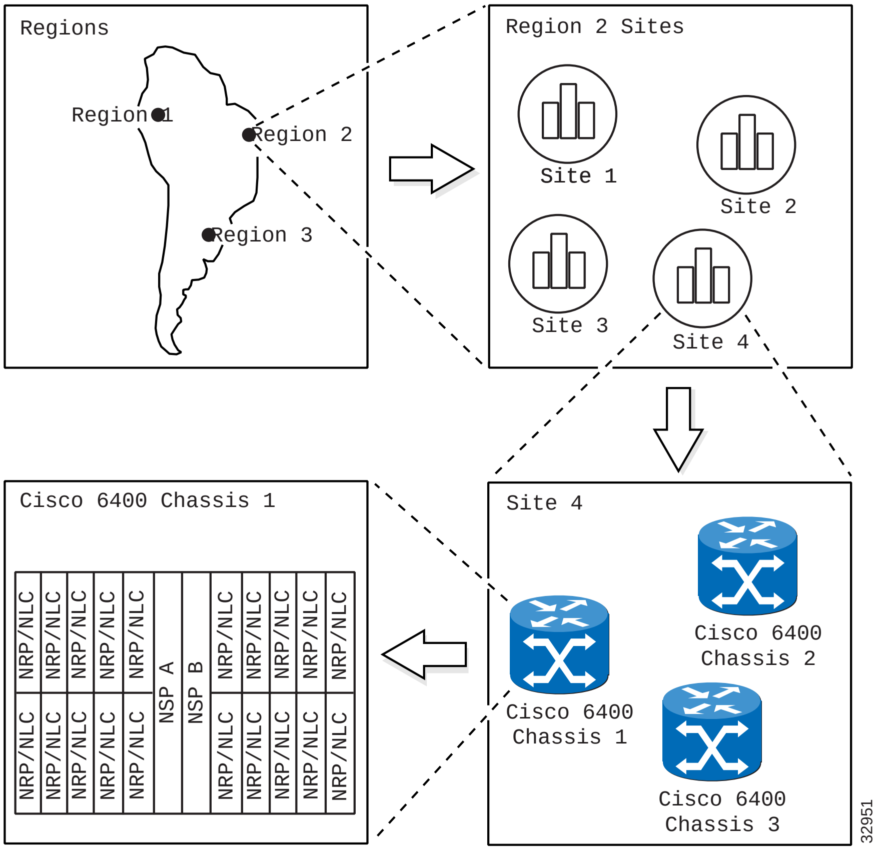
Figure 2-13 Management Containment Tree



The management containment populates the object pick lists that appear on the Element Management and the Service Connection Management windows.

Map Object Containment

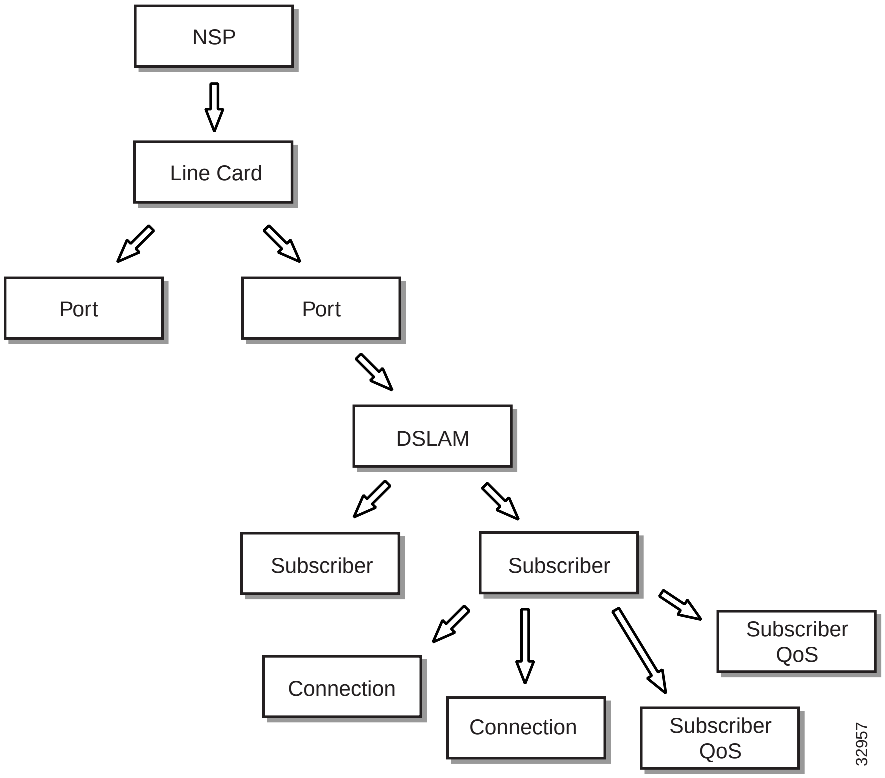
Figure 2-14 Map Object Containment Tree



The map object containment reflects the relationship between maps and displays a representation of the chassis front panel contents.

Subscriber Containment

Figure 2-15 Subscriber Containment Tree



A subscriber is connected to a DSLAM. A subscriber has a number of connection objects which are related to the subscriber by this containment. A connection object links a subscriber to a service instance. A subscriber also has a number of subscriber QoS which are used when the subscriber is connected to a service.

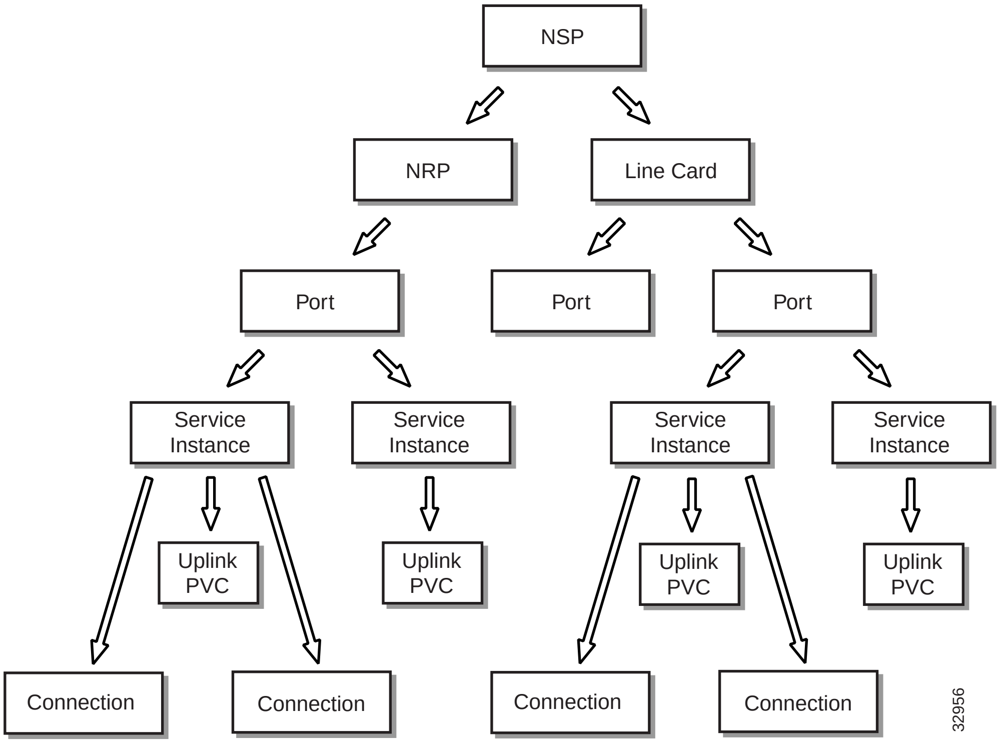
Profiles Containment

Profile containment is used by the Cisco 6400 SCM to store user generated service and QoS profiles.

Note Do not attempt to delete anything from this containment.

Service Instance Containment

Figure 2-16 Service Instance Containment Tree



A service instance (refer to the “Services” section on page 2-21), exists on either an NRP port or a line card port. A service instance has a number of dynamically created connections that are related to the service instance by this containment. A connection links a subscriber to a service instance.

Services

A service belongs to a specific service category and represents a physical service offered by a service provider (for example, **xyz-gold**). A service is also referred to as a service profile in the containment trees.

A service instance is a service deployed on a single Cisco 6400 SCM (for example, **xyz-gold.mtn-view-1**).

Cisco 6400 SCM Services

The Cisco 6400 UAC offers Layer 2 and Layer 3 services, for example tunneling and bridging. The provisioning of these services is quite a complex task. The 6400 SCM application is designed to help simplify this process.

The Cisco 6400 SCM currently supports the following services:

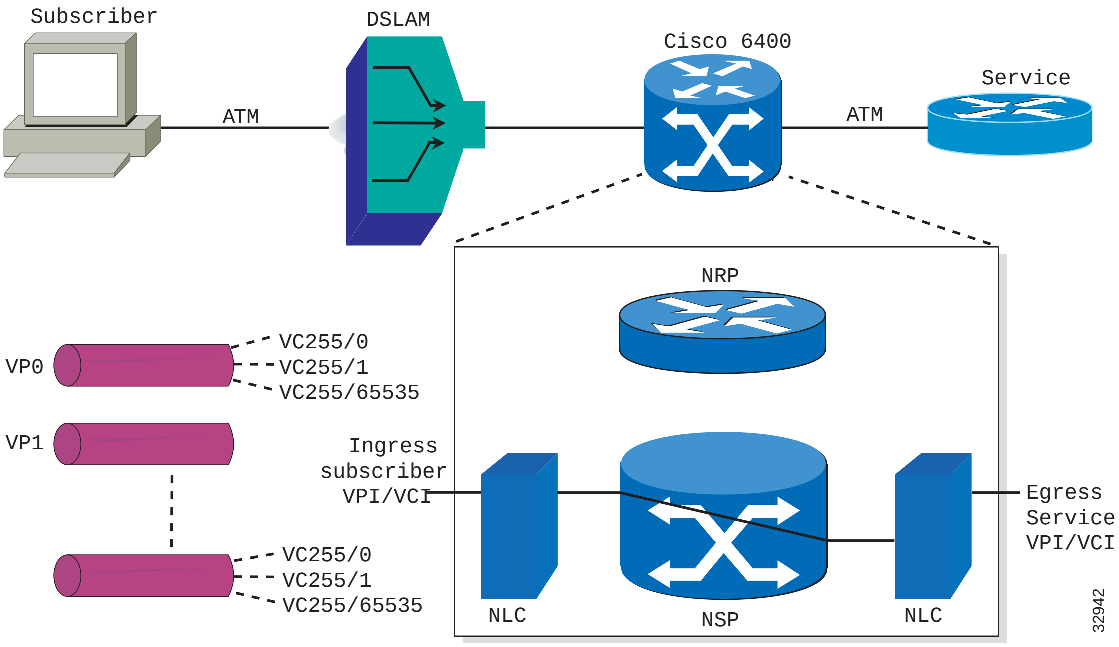
1. Pure ATM switching service
2. PPP-IP local termination service
3. PPP-L2TP tunneling service
4. Bridged-bridged service
5. Bridged-routed service
6. PPP Termination Aggregation over Multiple Domains (PTA-MD) service
7. Route Bridge Encapsulation (RBE) service
8. RFC1483 routed service

Each service is now discussed in greater detail.

Pure ATM Switching Service

Figure 2-17 shows an instance of a service which belongs to the Pure ATM Switching Service category which exists on the NSP and will connect two ATM ports (Subscriber & Service) on the NSP together.

Figure 2-17 Pure ATM Switching Service



The pure ATM switching service (left to right) connects subscribers using DSLAMs in the Cisco end-to-end DSL architecture via an ATM network or perhaps directly into the 6400, and there on to the service provider terminated by a router typically. In the 6400, then, for the pure ATM switching service, we don't actually use the NRPs (so the router blades are not used here). It is basically an ATM switch. So you configure the ATM service, choose the subscriber, VPI/VCI, choose the service, VPI/VCI and connect it together. The subscriber is therefore connected to the service provider via a pure ATM network without the need for routing functions.

Only the egress (outgoing) ATM port VPI/VCI parameters require to be set up, making the ATM service the simplest 6400 SCM service to set up.

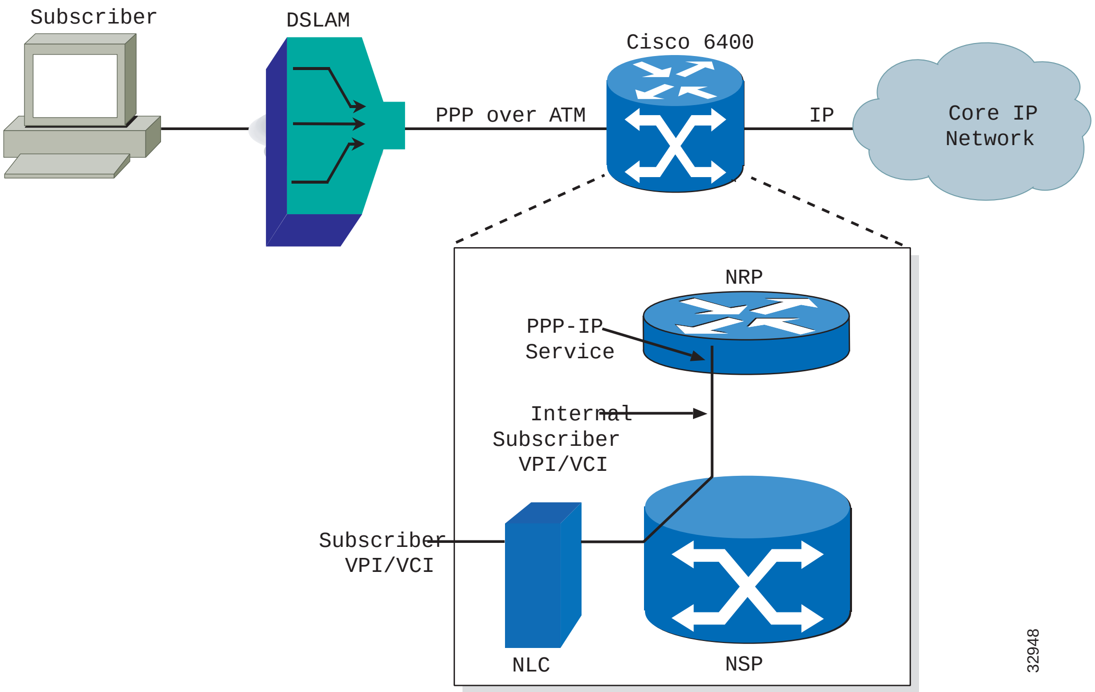
Refer to the “Service/Subscriber Provisioning” section on page 6-1 for further details on each of the Cisco 6400 SCM services.

PPP-IP Local Termination Service

Note Additional routing configuration information may be required to the NRP using IOS before configuring the PPP-IP local termination service. Refer to the “*Cisco 6400 UAC Command Reference Guide*” for further details.

Figure 2-18 shows an instance of a service which belongs to the PPP-IP (Local Termination) Service category which exists on the NRP where the Cisco 6400 is required to terminate PPP connections using the pre-defined IP Addresses, Authentication protocol etc. as defined in the Virtual Template for this particular service. This Virtual Template must be referenced by the Permanent Virtual Circuit (PVC) which is part of the connection.

Figure 2-18 PPP-IP Local Termination Service



The subscriber connects to the DSLAM (the protocol between DSLAM and the 6400 is PPP over ATM) and this is routed via the 6400 onto a core IP network. We configure from the incoming subscriber VPI/VCI through to the router (the NRP) and from there on in, the routing is the responsibility of the end customer.

Refer to the IOS documentation supplied with your Cisco 6400 UAC system for details of how to set up the uplink.

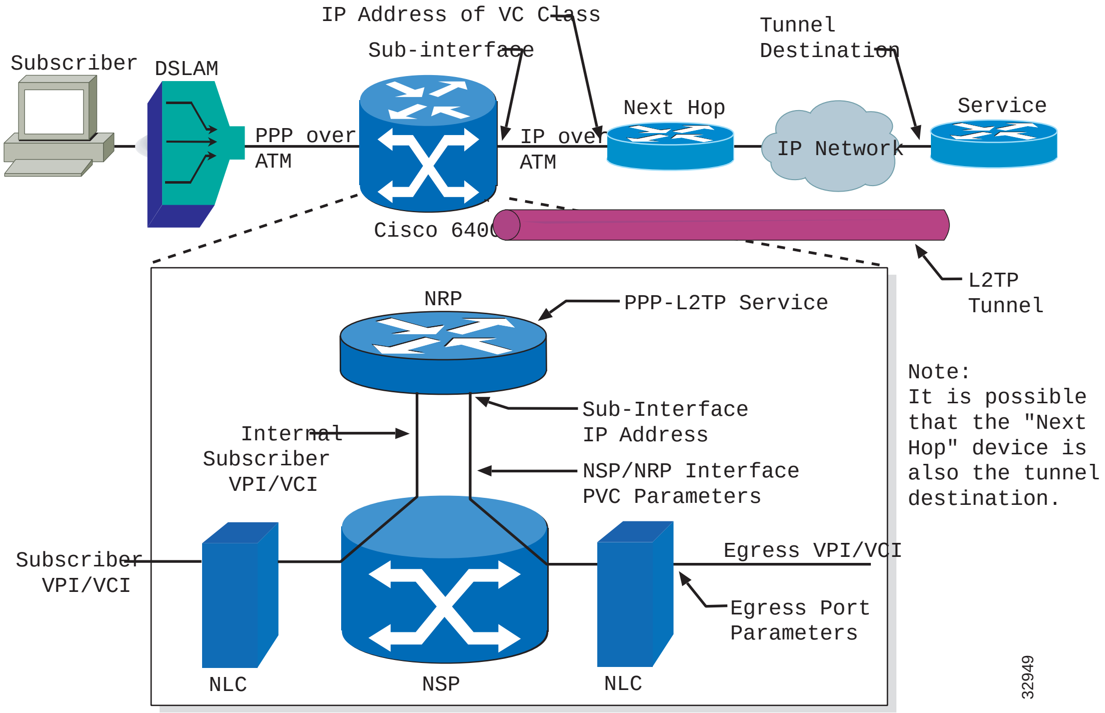
Refer to the "Service/Subscriber Provisioning" section on page 6-1 for further details on each of the Cisco 6400 SCM services.

PPP-L2TP Tunnelling Service

This service involves connecting the subscriber to an upstream service provider (for example, an Internet Service Provider (ISP)) through an L2TP tunnel.

The subscriber traffic is switched by the NSP onto the selected NRP and the tunnels set up between the uplink on the 6400 through the IP network to the service provider. The network architecture may not precisely match that shown in Figure 2-19. The exact network architecture will depend on the service provider requirements. There are a number of parameters required to set up the PPP-L2TP service and there are a number of network elements you must configure.

Figure 2-19 PPP-L2TP Tunneling Service



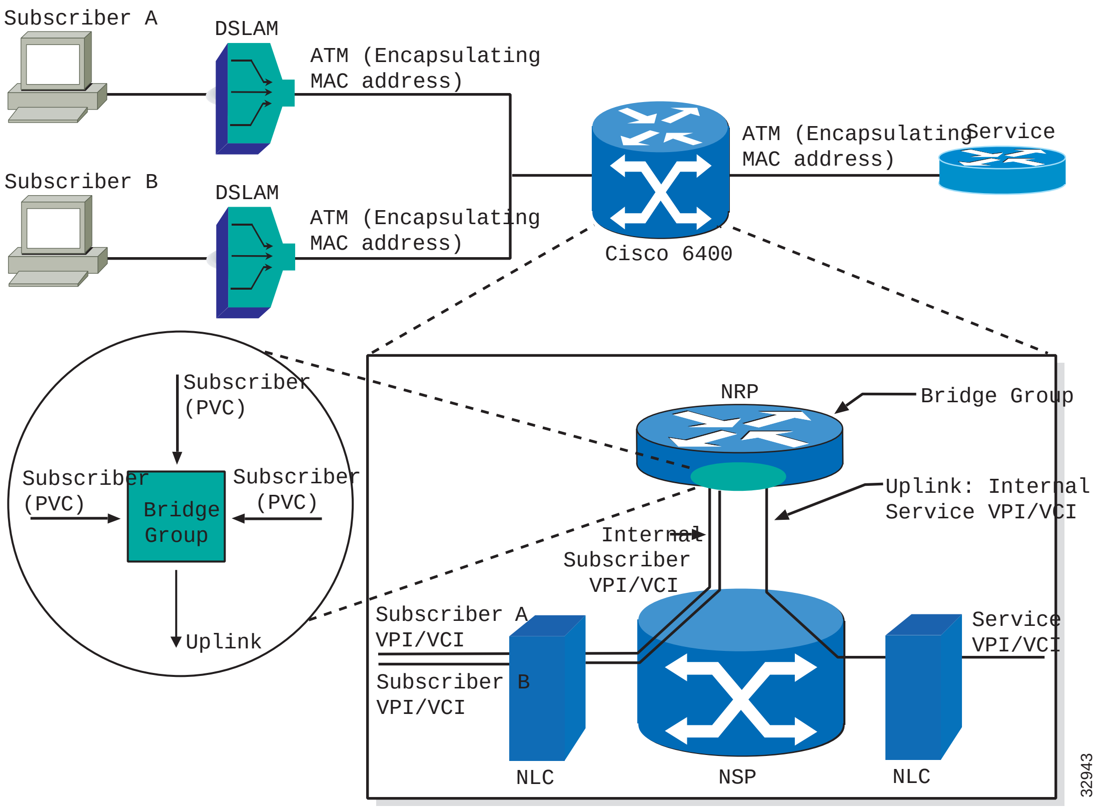
Note:
It is possible that the "Next Hop" device is also the tunnel destination.

Refer to the "Service/Subscriber Provisioning" section on page 6-1 for further details on each of the Cisco 6400 SCM services.

Bridged-Bridged Service

A bridge lets you connect multiple subscribers into a virtual LAN. The traffic being transmitted in an uplink are between each subscriber depending on how you configure the 6400 service. A bridge group is shown in the NRP in Figure 2-20. The bridge group is responsible for merging all this traffic together and passing it on to the uplink.

Figure 2-20 Bridged-Bridged Service

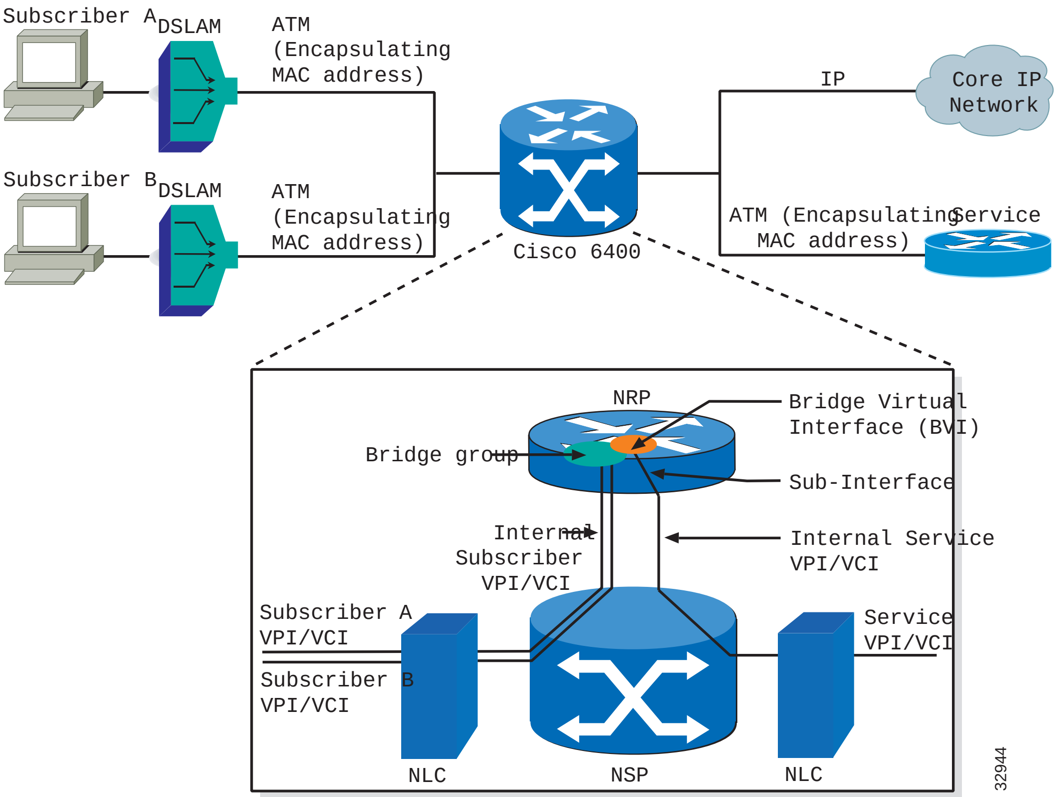


Refer to the "Service/Subscriber Provisioning" section on page 6-1 for further details on each of the Cisco 6400 SCM services.

Bridged-Routed Service

The Bridged-Routed service (shown in Figure 2-21) is a slight variant on the Bridged-Bridged service (shown in Figure 2-20).

Figure 2-21 Bridged-Routed Service



As well as the bridge, there is an amount of routing that takes place within the NRP. Multiple subscribers connected to a bridge group, virtual LAN capability, various types of switching, either on to service providers or on to core IP networks via the NRP.

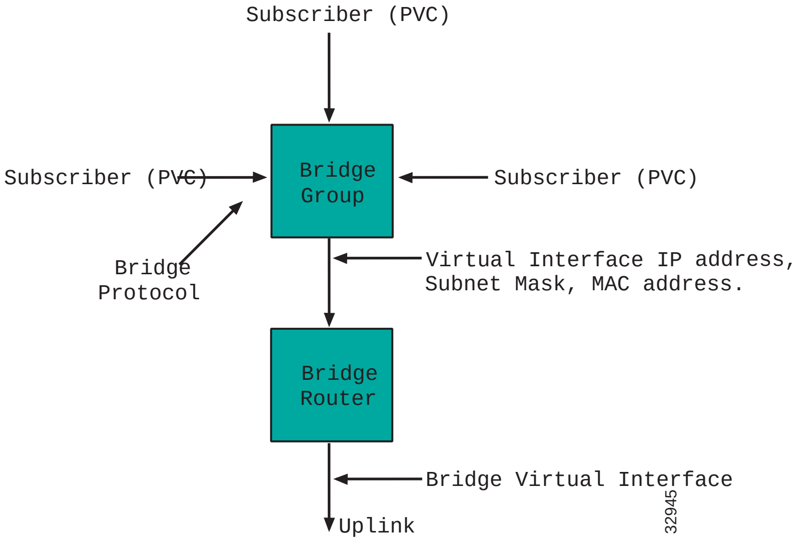
Refer to the "Service/Subscriber Provisioning" section on page 6-1 for further details on each of the Cisco 6400 SCM services.

Refer to the "Service Instance Configuration Window" section on page 7-22 for details on each of the parameters displayed on Figure 2-21.

Bridged Routed Service (Logical View)

Figure 2-22 shows a conceptual or logical view of the bridge group. Here, for the bridged-routed service, the bridge group takes in the subscribers via the bridge virtual interface and the routing that occurs on the way to the uplink.

Figure 2-22 Bridged Routed Service (Logical View)



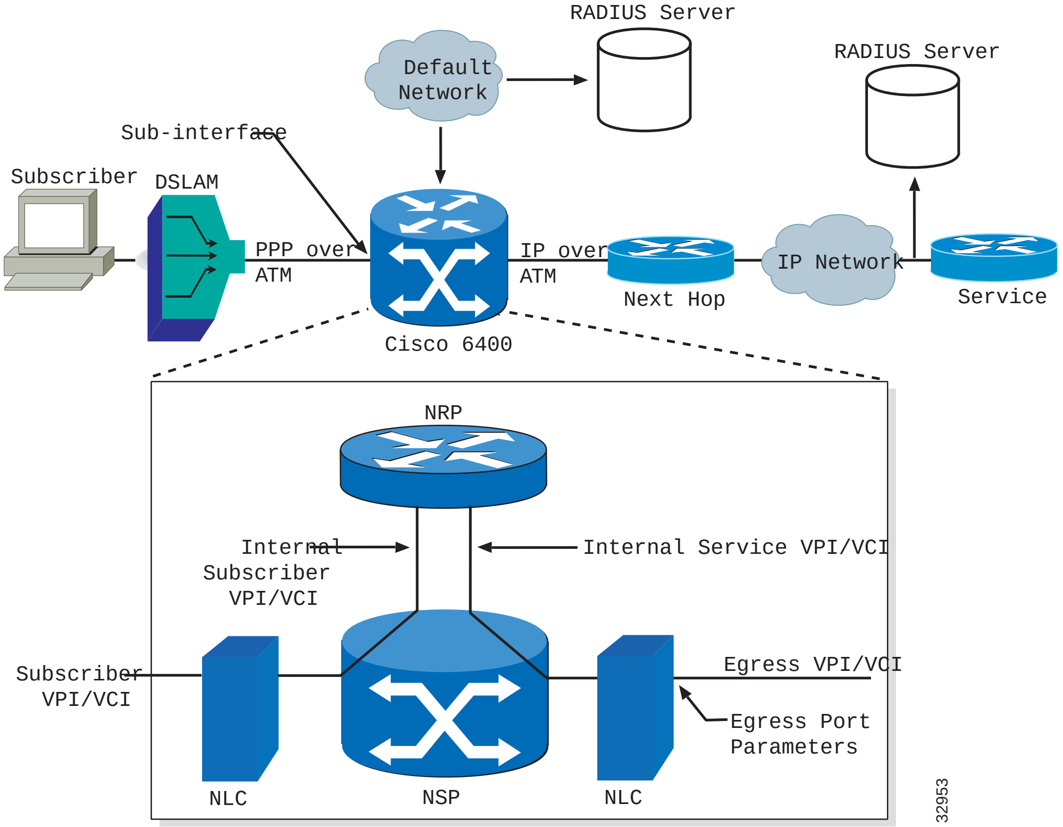
Refer to the “Service/Subscriber Provisioning” section on page 6-1 for further details on each of the Cisco 6400 SCM services.

PTA-MD Service

The PPP Termination Aggregation to Multiple Domains (PTA-MD) service (shown in Figure 2-23) is implemented by configuring Service Profiles locally on the NRP-SSG. The service can then be accessed by a subscriber using PPPoA or PPPoE. In the PPPoA case the subscriber can connect to the service, either statically or dynamically. In the PPPoE case the subscriber can only connect to the service dynamically.

Note The PTA-MD service is supported on NRP IOS version 12.0(3)DB and later.

Figure 2-23 PTA-MD Service



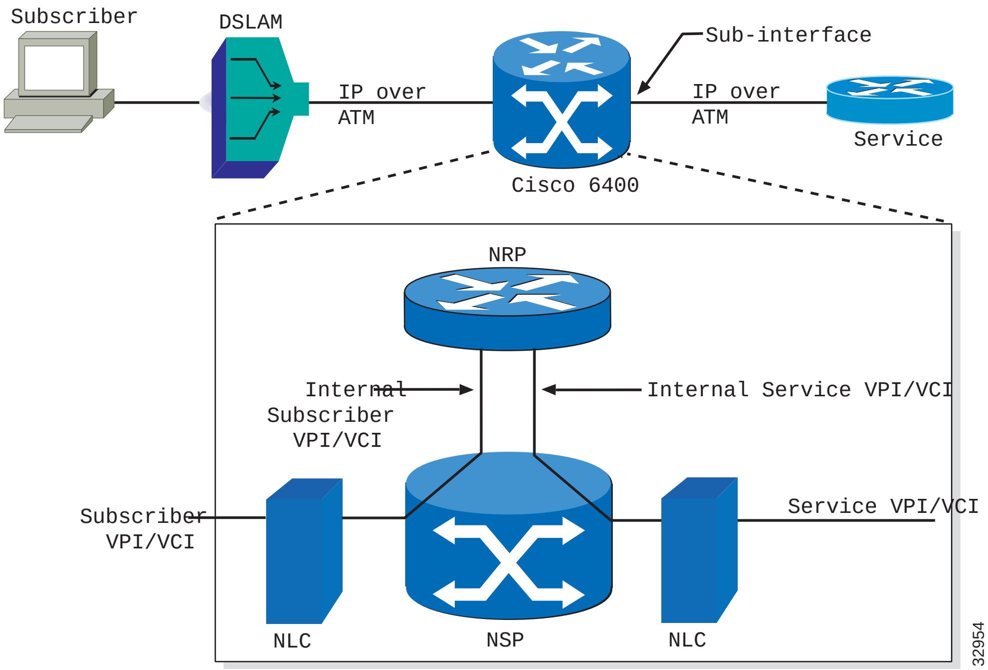
Refer to the “Service/Subscriber Provisioning” section on page 6-1 for further details on each of the Cisco 6400 SCM services.

Refer to the “PTA-MD Service Configuration Window” section on page 7-32 for details on each of the parameters displayed on Figure 2-23.

Route Bridge Encapsulation (RBE) Service

The Route Bridge Encapsulation (RBE) service (shown in Figure 2-24) is a layer 3 service that allows a subscriber to connect to a service dynamically without requirement to add static routes.

Figure 2-24 RBE Service



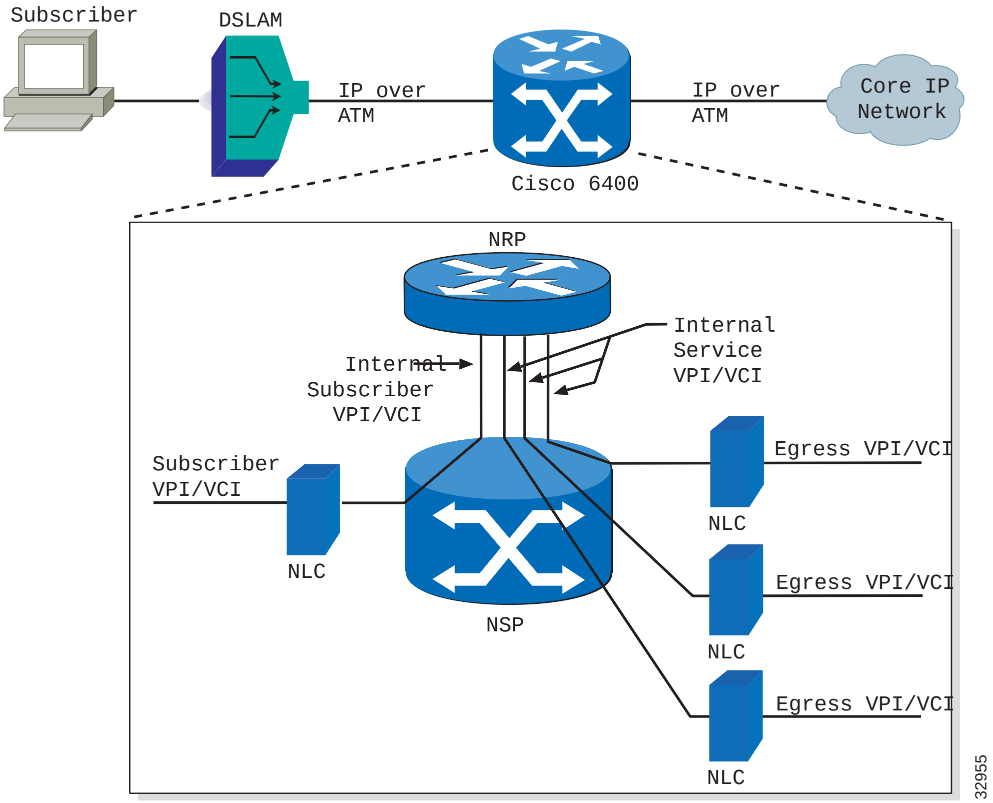
Refer to the "Service/Subscriber Provisioning" section on page 6-1 for further details on each of the Cisco 6400 SCM services.

RFC1483 Routing Service

Note Additional routing configuration information may be required to the NRP using IOS before configuring the RFC1483 routing service. Refer to the *Cisco 6400 UAC Command Reference Guide* for further details.

The RFC1483 Routing service (shown in Figure 2-25) connects subscribers to (potentially) multi point service uplink PVCs (residing within an uplink sub-interface), using AAL5 SNAP encapsulation to carry IP traffic over ATM. The IP traffic is routed by the NRP as required. This service is currently the only SCM-supported service that permits uplink PVCs.

Figure 2-25 RFC1483 Service



Refer to the “Service/Subscriber Provisioning” section on page 6-1 for further details on each of the Cisco 6400 SCM services.