EMC² | smarts

MPLS Manager

1.1

CONFIGURATION GUIDE

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Contents

Preface

This document provides instructions for configuring the InCharge MPLS Manager (MPLS Manager) and the InCharge Service Assurance Manager (Global Manager) to work with the MPLS Manager.

In addition, it includes instructions for checking certain default parameter settings for the Availability Manager and the Global Console.

Intended Audience

This document is intended for administrators and integrators who need to configure and maintain the MPLS Manager.

Prerequisites

It is assumed that readers of this document have the necessary administrative privileges and experience to properly install and configure network management software.

Document Organization

This document consists of the following chapters.

Table 1: Document Organization

1.	**INTRODUCTION**	Provides an architectural and functional overview of the MPLS Manager.
2.	**CONFIGURATION TASKS**	Provides information about configuring the MPLS Manager and the Global Manager, and indicates certain default parameter settings you must check in the Availability Manager.
3.	**CONFIGURING FOR DISCOVERY**	Describes how to configure environment variables to allow discovery using the CLI discovery probe, and how to control CLI-based discovery for specified devices.
B.	**UNDERSTANDING THE SM_EDIT UTILITY**	Explains the SMARTS sm_edit utility.

Documentation Conventions

Several conventions may be used in this document as shown in Table 2.

Table 2: Documentation Conventions

CONVENTION	EXPLANATION
`sample code`	Indicates code fragments and examples in Courier font
keyword	Indicates commands, keywords, literals, and operators in bold
`%`	Indicates C shell prompt
`#`	Indicates C shell superuser prompt
<parameter>	Indicates a user-supplied value or a list of non-terminal items in angle brackets
[option]	Indicates optional terms in brackets
/InCharge	Indicates directory path names in italics
yourDomain	Indicates a user-specific or user-supplied value in bold, italics
File > Open	Indicates a menu path in italics
▼▲	Indicates a command is wrapped over one or more lines. The command must be typed as one line.

Directory path names are shown with forward slashes (/). Users of the Windows operating systems should substitute back slashes (\) for forward slashes.

Also, if there are figures illustrating consoles in this document, they represent the consoles as they appear in Windows. Under UNIX, the consoles appear with slight differences. For example, in views that display items in a tree hierarchy such as the Topology Browser, a plus sign displays for Windows and an open circle displays for UNIX.

Finally, unless otherwise specified, the term InCharge Manager is used to refer to InCharge programs such as Domain Managers, Global Managers, and adapters.

InCharge MPLS Management Suite Installation Directory

In this document, the term **BASEDIR** represents the location where SMARTS software is installed.

- For UNIX, this location is: */opt/InCharge<n>/<productsuite>.*

- For Windows, this location is: *C:\InCharge<n>\<productsuite>.*

The *<n>* represents the SMARTS software platform version number. The *<productsuite>* represents the InCharge product suite to which the product belongs. For example, on UNIX operating systems, MPLS Manager is installed to */opt/InCharge6/MPLS/smarts* by default. On Windows operating systems, this product is installed to *C:\InCharge6\MPLS\smarts* by default. This location is referred to as **BASEDIR**/*smarts*.

Optionally, you can specify the root of **BASEDIR** to be something other than */opt/InCharge6* (on UNIX) or *C:\InCharge6* (on Windows), but you cannot change the *<productsuite>* location under the root directory.

For more information about the directory structure of SMARTS software, refer to the *InCharge System Administration Guide.*

MPLS Management Suite Products

The MPLS Management Suite offers the following products:

- MPLS Manager
- InCharge Adapter for Cisco ISC
- Perl API

Additional Resources

In addition to this document, SMARTS provides the following resources.

InCharge Commands

Descriptions of InCharge commands are available as HTML pages. The *index.html* file, which provides an index to the various commands, is located in the **BASEDIR**/smarts/doc/html/usage directory.

Documentation

Readers of this document may find other SMARTS documentation (also available in the **BASEDIR**/smarts/doc/pdf directory) helpful.

InCharge Documentation

The following SMARTS documents are product independent and thus relevant to users of all InCharge products:

- *InCharge Release Notes*
- *InCharge Documentation Roadmap*
- *InCharge System Administration Guide*
- *InCharge ICIM Reference*
- *InCharge Dynamic Modeling Tutorial*
- *InCharge Managed Object Definition Language Reference Guide*
- *InCharge ASL Reference Guide*
- *InCharge Perl Reference Guide*

MPLS Management Suite Documentation

The following SMARTS documents are relevant to users of the MPLS Management Suite product suite:

- *InCharge MPLS Management Suite Installation Guide*

- *InCharge MPLS Manager User's Guide*

- *InCharge MPLS Manager Configuration Guide*

- *InCharge IP Discovery Guide Supplement for MPLS*

- *InCharge MPLS Manager User's Guide for the Cisco ISC Adapter*

- *InCharge MPLS Management Suite Release Notes*

Refer to the *InCharge Documentation Roadmap* for documentation resources provided with other SMARTS product suites.

Technical Support

For questions about technical support, call your local sales office or service provider. For service, call one of the following numbers:

United States: 800.782.4362 (SVC.4EMC)

Canada: 800.543.4782 (543.4SVC)

Worldwide: 508.497.7901

EMC Powerlink

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Introduction

This chapter introduces the InCharge MPLS Management Suite and provides a brief architectural and functional overview of the suite.

InCharge MPLS Management Suite consists of the SMARTS MPLS Manager and the optional EMC Smarts Adapter for Cisco ISC.

The MPLS Manager, working with InCharge Service Assurance Manager (Global Manager) and InCharge IP Availability Manager (Availability Manager), manages MPLS networks and the VPNs configured and provisioned over them. The MPLS Manager provides management capabilities for both the MPLS and the VPN domains of an MPLS network. It also provides for the mapping and correlation among the domains, and between the MPLS domains and the underlying transport domain, by means of cross domain correlation and cross domain impact analysis. (The underlying transport domains are managed and discovered by the Availability Manager.) Notifications, topology, and maps are displayed through the Global Console.

In addition, the MPLS Manager works with specialized adapters to synchronize provisioning data and events with provisioning systems, such as the Cisco IP Solution Center (ISC).

Architectural and Functional Overview

Figure 1 illustrates the components for an MPLS solution and the flow of information among them.

- The Availability Manager performs discovery and polling of the underlying transport domain in the MPLS network, and then sends topology and events to both the MPLS Manager and the Global Manager.

- The MPLS Manager performs discovery and polling of the MPLS network, and then sends topology and events to the Global Manager.

- The Global Manager sends VPN provisioning data to the MPLS Manager, and VPN data and notifications to the Global Console. The Global Manager consolidates information from the managed domains, correlates and aggregates notifications from the underlying analysis servers, and provides end-to-end impact analysis.
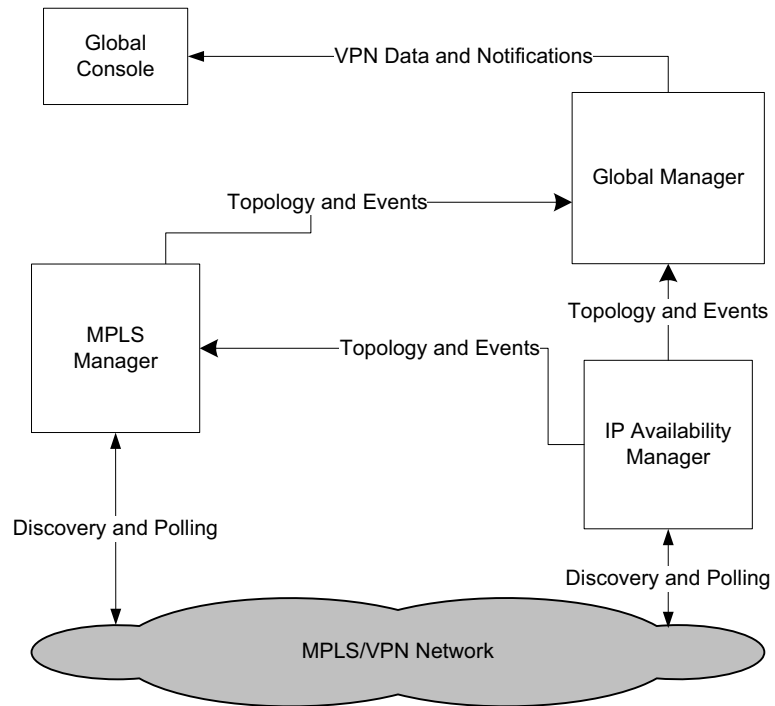
Figure 1: MPLS Solution Architecture Topology and Events Flow

Figure 2 shows the same information flow with the addition of a customer provisioning system and customized adapter. In this case, the customer provisioning system sends VPN provisioning data and events to the customized adapter. The adapter communicates discovery and provisioning information to and from the Global Manager.
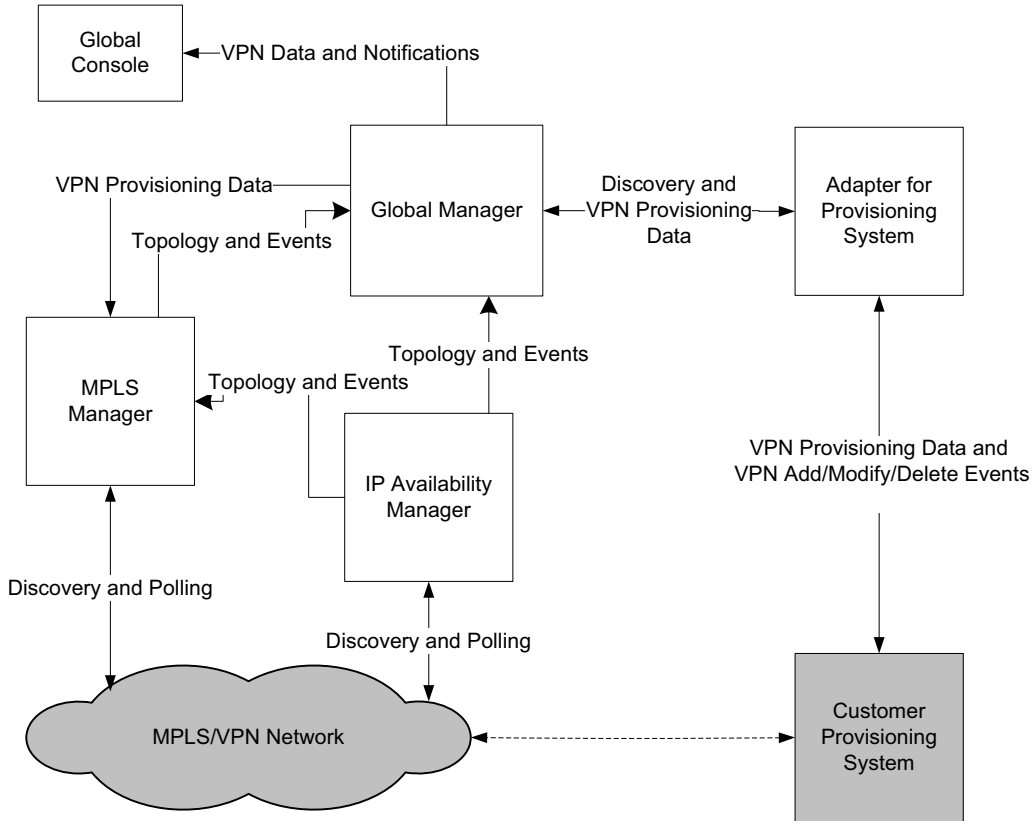
Figure 2: MPLS Solution Architecture Supporting Customer Provisioning System

Availability Manager

The Availability Manager discovers physical and logical Layer 2 and Layer 3 network elements in multi-vendor, switched, and routed networks. It monitors and analyzes network connectivity, sends network topology and event information to the Global Manager, and sends MPLS-relevant topology and event information to the MPLS Manager.

MPLS Manager

The MPLS Manager manages MPLS networks and VPNs configured and provisioned over them, in accordance with the IETF RFC 2547bis standard. It provides management capabilities for both the MPLS and the VPN domains of an MPLS network. It also provides for the mapping and correlation among the domains, and between the MPLS and VPN domains and the underlying transport domain, by means of cross domain correlation and cross domain impact analysis.

Global Manager

The Global Manager integrates the topology and event information imported from the Availability Manager and the MPLS Manager and relates the information to services and customers. It also provides cross-domain and end-to-end impact analysis.

The Global Manager displays the topology, event, and impact information through the Global Console.

Global Console

The Global Console enables users to browse the network protocol topology in various forms, including maps, and to view notifications about events that impact MPLS availability.

2

Configuration Tasks

This chapter describes the configuration tasks for the following:

- MPLS Manager
- Global Manager

Configuring the MPLS Manager

By default, the MPLS Manager is configured to use an Availability Manager named INCHARGE-AM as a source for topology and events. You can change this name and/or add one or more additional Availability Managers as sources to MPLS Manager by editing the *LOCAL.import* file, which is located in the **BASEDIR**/smarts/conf/mpls-vpn directory of the MPLS Manager installation area.

You use the *sm_edit* utility to edit the *LOCAL.import* file. For information about *sm_edit*, see *Understanding the sm_edit Utility* on page 13.

Adding Availability Managers as Sources for the MPLS Manager

To add an Availability Manager as a source to the MPLS Manager or to change the default Availability Manager name, follow these steps:

1 Go to the **BASEDIR**/smarts/bin directory in the MPLS Manager installation area and open *LOCAL.import* using the *sm_edit* utility:

```
sm_edit conf/mpls-vpn/LOCAL.import
```

2 Find the section, *Instances of AM Server*, and go to the section below the comments:

```
InChargeDomain::InChargeDomain_INCHARGE-AM {
Type = "AM"
DomainName = "INCHARGE-AM"
DisplayName = "INCHARGE-AM"
}
```

3 Change the name from INCHARGE-AM to the name of your Availability Manager. For InChargeDomain and DomainName, enter the same Availability Manager name. For DisplayName, enter the name to be listed in the topology. See the example below:

```
InChargeDomain::InChargeDomain_<Availability Manager> {
Type = "AM"
DomainName = "<Availability Manager>"
DisplayName = "<topology display name>"
}
```

4 To specify additional Availability Manager sources, copy and paste additional versions of the InChargeDomain section and then follow the directions given in Step 3.

5 Save the *LOCAL.import* file. The modified version of the file is saved to the **BASEDIR**/smarts/local/conf/mpls-vpn directory.

6 If the MPLS Manager was running before you changed the *LOCAL.import* file, restart the MPLS Manager.

At startup, the MPLS Manager reads the *LOCAL.import* file, saves the configuration information in its repository, and imports all routers discovered by the Availability Manager sources.

Configuring the Global Manager

In addition to the configuration and administration tasks common to all Global Managers, you must edit the Global Manager *ics.conf* file so that Availability Manager and MPLS Manager data can be imported into the Global Manager.

Ensure that the appropriate version of the Global Manager is installed. Check the *EMC Smarts MPLS Management Suite Release Notes* for version and patch requirements.

For general information about configuring the Global Manager, see the *InCharge Service Assurance Manager Configuration Guide*.

Configuring the isc.conf File

You must uncomment DomainType entries for the MPLS Manager in the Global Manager *ics.conf* file. (The DomainType entry for the Availability Manager is uncommented by default.) This file is located in the **BASEDIR**/*smarts/conf/ics* directory of the Global Manager install area.

In the DomainType entries section, use the *sm_edit* utility to uncomment the existing MPLS Manager section, or add an MPLS Manager section to the file. For more information, see *Understanding the sm_edit Utility* on page 13.

The following illustrates the uncommented DomainType entries for the MPLS Manager in the *ics.conf* file. The minimum certainties and smoothing intervals for the MPLS Manager are set to the same values as for the Availability Manager.

```
DomainSection
{
.
.
.
#   DomainType definition for MPLS.
    DomainType
    {
        ConfFile          = "dxa-mpls-vpn-ics.conf";
        MinimumCertainty  = 0.24;
        SmoothingInterval = 65;
##       HookScript        = "ics/dxa-sample-hook.asl";
        Name              = "INCHARGE-MPLS";
    }
```

Note: Do not uncomment the HookScript fields unless you customize the associated ASL hookscript files.

Security

An MPLS Manager deployment can employ encrypted connections with other SMARTS applications.

For detailed information about SMARTS secure communications, see the *InCharge System Administration Guide*.

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Configuring for Discovery

This chapter describes the following discovery configuration tasks for the MPLS Manager:

- Configuring environment variables to allow discovery using the CLI discovery probe

- Controlling CLI-based discovery for specified devices

Configuring Environment Variables

The MPLS Manager uses specific CLI commands to obtain information regarding MPLS-enabled interfaces on devices, the MPLS forwarding tables, VPNs, VRFs configured on the devices, and sessions between the devices and other MPLS-enabled devices.

The CLI commands are invoked automatically during the discovery process using a CLI discovery probe. The set of commands invoked for the devices depend on the type of device and the availability of topological information through SNMP on that device.

For Cisco devices, the MPLS Manager first attempts to obtain this information using SNMP. If the requested MIBs are not available on the device (because the version of the device operating system does not support them), MPLS Manager uses the CLI discovery probe.

For Juniper M/T devices, the MPLS Manager discovers VPN information using a specific MIB; it gets MPLS information via the CLI discovery probe. For Juniper ERX virtual router devices MPLS Manager launches the CLI discovery probe because the vendor does not support the MIBs needed for VPN and MPLS discovery.

Configuring Variables for the CLI Discovery Probe

The CLI discovery probe automates a telnet session with the network devices using the EXPECT variable. The commands used by the probe require "enable" privileges on the device. In order to allow the automated telnet setting, you must configure the EXPECT variables once before starting MPLS Manager.

Use the *sm_edit* utility to specify three environment variables on the shell on which the MPLS Manager is running. For more information, see *Understanding the sm_edit Utility* on page 13.

Table 1 lists the environment variables for Cisco and Juniper devices.

Table 1: Environment Variables for Discovery on Cisco and Juniper Devices

VARIABLE	DESCRIPTION
EXPECT_ENABLE (Cisco only)	Password that provides administrative access through the ENABLE function for the telnet session. There must be an entry for this variable; if no password is enabled on the Cisco device, enter any value, for example, XXX.
EXPECT_USER_ID	UserID for the ENABLE function. If this UserID is configured on the Cisco or Juniper device, enter the correct value. There must be an entry for this variable; if there is no configured UserID, enter any value, for example, XXX.
EXPECT_PASSWORD	User password for the device

Note: All MPLS-enabled devices in the network must be configured with the same user name and password.

To edit the file, follow these steps:

1 Issue the *sm_edit* command:

```
# ./sm_edit local/conf/runcmd_env.sh
```

2 Enter values for the variables, as described in Table 1.

3 Save the file.

4 Start the MPLS Manager.

For more information about sm_edit, see *Understanding the sm_edit Utility* on page 13.

Controlling CLI-based Discovery for Specified Devices

The MPLS Manager is configured with default settings that support discovery of all routers in the managed network, as described in the *Architectural and Functional Overview* on page 2.

If you prefer not to discover all routers, you can configure the MPLS Manager to discover only the devices you specify, using CLI-based discovery. In this case, all other devices are excluded from CLI discovery.

Use the *sm_edit* utility to specify the devices (or a range of IP addresses) for CLI discovery using the LOCAL.import file. For more information about sm_edit, see *Understanding the sm_edit Utility* on page 13.

Note: The *LOCAL.import* file is loaded during MPLS service startup.

Follow these steps:

1 At the **BASEDIR**/*MPLS/smarts directory*, issue the following command:

```
# ./sm_edit conf/mpls-vpn/LOCAL.import
```

2 At the top of the *LOCAL.import* file, look at the relevant section of the MPLS-MANAGER definition, and uncomment the lines shown below:

```
MPLSManager::MPLS-Manager {

CLIProhibit = TRUE

CLIFilter = "*"

CLIFilterType "CLI_AGENTADDRESS"

}
```

3Change the value of the *CLIProhibit* attribute to FALSE.

4 In the *CLIFilter* attribute, type in the device name or IP address to discover, replacing the asterisk. You can use wildcards to extend the range of the IP address; for example, 172.16.* You can also use wildcards to specify a range of system names; for example, R1*.

5 Depending on whether you used a name or IP address, ensure that the value of the *CLIFilterType* attribute is set to the appropriate option, as indicated below:

- Name—Use CLI_AGENTADDRESS

- IP address—Use CLI_SYSTEMNAME

6 Save the file and close the window.

Restart the MPLS Manager, if the manager was running before you changed the *LOCAL.import* file.

B

Understanding the sm_edit Utility

As part of the SMARTS deployment and configuration process, you will need to modify certain files. User modifiable files include SMARTS tool scripts, configuration files, rule set files, and templates. Original versions of these files are installed into appropriate subdirectories under the **BASEDIR**/smarts/ hierarchy. For example, on UNIX operating systems the original versions of Global Manager configuration files are installed to /opt/InCharge6/SAM/smarts/conf/ics.

To facilitate proper file editing, SMARTS provides the *sm_edit* utility with every product suite. When used to modify an original version of a file, this utility automatically creates a local copy of the file and places it in the appropriate location under **BASEDIR**/smarts/local. This ensures that the original version of the file remains unchanged.

SMARTS software is designed to first search for user modifiable files in **BASEDIR**/smarts/local or one of its subdirectories. If a modified version of a file is not found in the local area, the software then searches appropriate nonlocal directories.

Note: Original versions of files may be changed or updated as part of a SMARTS software upgrade. However, files located in **BASEDIR**/smarts/local are always retained during an upgrade.

In both UNIX and Windows environments, you can invoke *sm_edit* from the command line. Optionally, you can configure Windows so that *sm_edit* is automatically invoked when user-modifiable files are double-clicked in Windows Explorer.

To invoke the *sm_edit* utility from the command line, specify the path and the name of the file you want to edit under **BASEDIR***/smarts.* If multiple SMARTS products are running on the same host, you should ensure that you invoke *sm_edit* from the *bin* directory of the product suite whose files you wish to edit. For example, to edit the configuration file for the Global Manager, you invoke the *sm_edit* utility as follows:

```
# /opt/InCharge6/SAM/smarts/bin/sm_edit conf/ics/ics.conf
```

The *sm_edit* utility automatically creates a local copy of the *ics.conf* file in the **BASEDIR***/smarts/local/conf/ics* directory, if necessary, and opens the file in a text editor. If a local version of the file already exists, the *sm_edit* utility opens the local version in a text editor. In addition, *sm_edit* creates any necessary directories.

For more information about how to properly edit user modifiable SMARTS files and how to use the *sm_edit* utility, refer to the *InCharge System Administration Guide.*

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