

*InCharge*TM

An Introduction to Service Assurance Manager

Version 6.2



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Preface

The InCharge Service Assurance Manager (Service Assurance) solution automatically correlates topology and event data from multiple InCharge managed domains to diagnose root-cause problems and (with Business Impact Manager) the impact that those problems have on business-critical processes and services. InCharge managed domains can include IP networks, systems, routing protocols, ATM/Frame Relay, applications, and business entities. Service Assurance Manager enables operations personnel to effectively prioritize their time and resources to maintain and sustain the business-critical processes and services.

Purpose

An Introduction to InCharge Service Assurance Manager provides high-level architectural and functional overviews of the InCharge Service Assurance Manager solution. It also provides several examples of implementation scenarios.

Intended Audience

This document is intended for operations staff, managers, and administrators who are interested in automated Service Assurance solutions.

Document Organization

This document consists of the following sections:

1. ARCHITECTURAL OVERVIEW	Provides an architectural overview of the InCharge Service Assurance Manager and the modules that can be implemented to extend its capabilities
2. FUNCTIONAL OVERVIEW	Provides a functional overview of the InCharge Service Assurance Manager and the modules that can be implemented to extend its capabilities
3. IMPLEMENTATION SCENARIOS	Describes two environments in which InCharge Service Assurance Manager can be implemented

Table 1: Document Organization

Documentation Conventions

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

CONVENTION	EXPLANATION
<code>sample code</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
<i>/InCharge</i>	Indicates directory path names in italics
<i>yourDomain</i>	Indicates a user-specific or user-supplied value in bold, italics
<i>File > Open</i>	Indicates a menu path in italics
▼▲	Indicates a command that is formatted so that it wraps over one or more lines. The command must be typed as one line.

Table 2: Documentation Conventions

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 Installation Directory

In this document, the term **BASEDIR** represents the location where InCharge 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 InCharge software platform version number. The `<productsuite>` represents the InCharge product suite that the product is part of.

Table 3 defines the `<productsuite>` directory for each InCharge product.

PRODUCT SUITE	INCLUDES THESE PRODUCTS	DIRECTORY
InCharge IP Management Suite	<ul style="list-style-type: none"> • IP Availability Manager • IP Performance Manager • IP Discovery Manager • InCharge Adapter for HP OpenView NNM • InCharge Adapter for IBM/Tivoli NetView 	/IP

PRODUCT SUITE	INCLUDES THESE PRODUCTS	DIRECTORY
InCharge Service Assurance Management Suite	<ul style="list-style-type: none"> • Service Assurance Manager • Global Console • Business Dashboard • Business Impact Manager • Report Manager • SAM Failover System • Notification Adapters • Adapter Platform • SQL Data Interface Adapter • SNMP Trap Adapter • Syslog Adapter • XML Adapter • InCharge Adapter for Remedy • InCharge Adapter for TIBCO Rendezvous • InCharge Adapter for Concord eHealth • InCharge Adapter for InfoVista • InCharge Adapter for NetIQ AppManager 	/SAM
InCharge Application Management Suite	<ul style="list-style-type: none"> • Application Services Manager • Beacon for WebSphere • Application Connectivity Monitor 	/APP
InCharge Security Infrastructure Management Suite	<ul style="list-style-type: none"> • Security Infrastructure Manager • Firewall Performance Manager • InCharge Adapter for Check Point/Nokia • InCharge Adapter for Cisco Security 	/SIM
InCharge Software Development Kit	<ul style="list-style-type: none"> • Software Development Kit 	/SDK

Table 3: Product Suite Directory for InCharge Products

For example, on UNIX operating systems, InCharge IP Availability Manager is, by default, installed to `/opt/InCharge6/IP/smarts`. 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 InCharge software, refer to the *InCharge System Administration Guide*.

Additional Resources

In addition to this manual, 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 manual 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 ASL Reference Guide*
- *InCharge Perl Reference Guide*

InCharge Service Assurance Manager Documentation

The following SMARTS documents are relevant to users of the InCharge Service Assurance Management product suite.

- *InCharge Service Assurance Management Suite Installation Guide*
- *An Introduction to InCharge Service Assurance Manager*
- *InCharge Operator's Guide*
- *InCharge Service Assurance Manager Configuration Guide*
- *InCharge Service Assurance Manager Business Dashboard Configuration Guide*
- *InCharge Service Assurance Manager User's Guide for Business Impact Manager*

- *InCharge Service Assurance Manager User's Guide for Report Manager*
- *InCharge Service Assurance Manager Failover System User's Guide*

The following SMARTS documents are relevant to InCharge Service Assurance Manager adapters.

- *InCharge Service Assurance Manager Notification Adapters User's Guide*
- *InCharge Service Assurance Manager SQL Data Interface Adapter User's Guide*
- *InCharge Service Assurance Manager Adapter Platform User's Guide*
- *InCharge XML Adapter User's Guide*
- *InCharge Service Assurance Manager User's Guide for Remedy Adapter*
- *InCharge Service Assurance Manager User's Guide for Concord eHealth Adapter*
- *InCharge Service Assurance Manager User's Guide for InfoVista Adapter*

InCharge Application Services Manager Documentation

The following SMARTS documents are relevant to users of InCharge Application Service Manager.

- *InCharge Application Management Suite Installation Guide*
- *InCharge Application Services Manager User's Guide*
- *InCharge Application Services Manager Discovery Guide*
- *InCharge Application Connectivity Monitor User's Guide*

InCharge IP Management Documentation

The following SMARTS documents are relevant to users of the InCharge IP Management product suite.

- *InCharge IP Management Suite Installation Guide*
- *InCharge IP Deployment Guide*
- *InCharge IP Discovery Guide*
- *InCharge IP Availability Manager User's Guide*
- *InCharge IP Performance Manager User's Guide*

- *InCharge IP Adapters User's Guide*

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Architectural Overview

This chapter provides an architectural overview of InCharge Service Assurance Manager (Service Assurance), the Service Assurance Manager adapters, and the Service Assurance modules (InCharge Business Impact Manager, Report Manager, Web Console, and Business Dashboard) that can be implemented to extend the capabilities of Service Assurance.

InCharge Service Assurance Manager is a full-featured, open solution for managing the technology infrastructure that supports business services. As the cornerstone of network operations management, it provides integrated, unified, and individualized views of the systems, network infrastructure, applications, and business entities that comprise the managed domain.

Service Assurance imports topology and event information from the underlying managed domains (distributed management applications), consolidates the information, and interprets problems in the context of their impact on business services. Service Assurance provides operations personnel with meaningful information with which automated corrective actions can be associated.

The Service Assurance modules provide the capabilities to calculate the business impact of infrastructure problems, to produce a wide variety of operational and management reports, and to display customer-specific information to a given enterprise or service provider customer through a secure channel.

Service Assurance Manager Architecture

Figure 1 illustrates the overall architecture of the InCharge Service Assurance Manager and its adapters and modules.

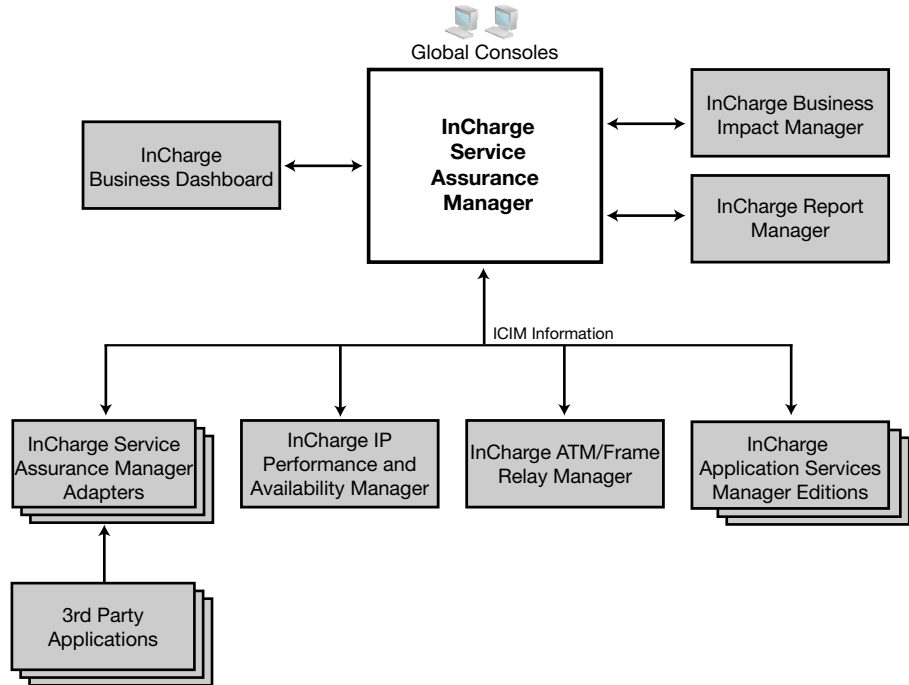


Figure 1: InCharge Service Assurance Manager Architecture

InCharge Service Assurance Manager abstracts topology information and cross-correlates and consolidates event information from distributed InCharge applications and third-party applications. Note that the InCharge applications are responsible for discovering and monitoring infrastructure elements, and correlating event information within their respective managed domains.

Service Assurance, other InCharge applications, and/or third-party applications communicate by way of a shared Information Bus that employs the InCharge Common Information Model™ (ICIM). Once Service Assurance abstracts high-level views of the distributed topologies from the underlying applications, it correlates, consolidates, and integrates event information collected from the applications, and enriches the event information with the severity of the events.

Event information (for example, root-cause problems and their impacts and severities) are displayed in the Service Assurance Notification Log Console, Topology Browser Console, Map Console, and/or Summary View Console. From these consoles, operations personnel can invoke diagnostic or corrective tools, store the information for management and operations reports, and send the information to third-party applications.

The Service Assurance Manager

The Service Assurance Manager, also referred to as the *Global Manager*, is the Service Assurance component that serves as the central point for monitoring and managing your entire technology infrastructure by obtaining data from multiple distributed domains. The Global Manager communicates with the underlying distributed InCharge applications and abstracts and consolidates:

- Network, system, application, and business resources
- Results of domain-specific root-cause analysis
- Results of domain-specific impact analysis

The Global Manager scales to large topologies because it maintains a high-level, abstract representation of the topology. The detailed topology information—and therefore the bulk of the data—is kept in other InCharge applications. When needed, the Global Manager retrieves detailed information from the underlying domains.

The Global Manager can attach to multiple, distributed InCharge applications as well as other Global Managers. It can also be integrated with third-party applications from which it can receive topology and event information, and to which it can send event information or initiate corrective actions.

The Global Manager, in conjunction with InCharge Report Manager, sorts and stores event-related information in an ODBC-compliant database from which users can produce a variety of management, operations, and business impact reports.

The Global Console

InCharge Service Assurance Manager includes a user interface that provides different views into InCharge managed domains.

The Global Console displays topology and notifications as well as summary, containment, and status information. InCharge operators use the Global Console to monitor InCharge domains, acquire detailed information (on demand) about topology and events, respond to problems, and take corrective action. InCharge administrators with appropriate privileges and access control can use the Global Console to discover InCharge topology, administer underlying InCharge domains, as well as administer InCharge users, user profiles, program tools, and escalation policies.

The Global Console runs as a standalone Java program.

Integration With Third-Party Applications

Since InCharge Service Assurance Manager is an open solution, it is possible to integrate Service Assurance with third-party applications and other InCharge applications by way of Service Assurance Manager (SAM) adapters (See Figure 2.)

InCharge SAM adapters, which normalize data in accordance with the InCharge Common Information Model (ICIM), enable the importation or exportation of topology and event information. The topology information is stored in the repository of the Global Manager. As event data is forwarded to Service Assurance through the adapters, the system correlates the third-party event data with the corresponding elements in the Global Manager's repository.

SAM adapters also enable InCharge Service Assurance Manager to forward event information to third-party applications, such as trouble ticketing systems.

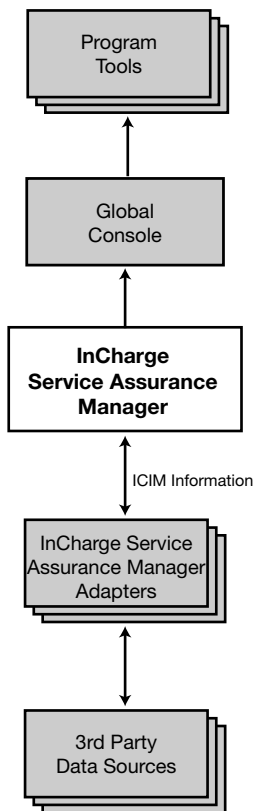


Figure 2: Integration With Third-Party Applications

Service Assurance Failover System

To maintain critical availability, InCharge Service Assurance Manager can be implemented with a Failover System. The Service Assurance Failover System ensures that the managed environment continues to be monitored when the primary Global Manager becomes unavailable because of a hardware failure or system malfunction. Redundancy is provided by a secondary Global Manager that serves as a backup to the primary Global Manager. The Service Assurance Failover System, which is configured to match the primary system, monitors the primary Global Manager. The Failover System periodically copies the repository file to the secondary Global Manager, thus preserving important topology and configuration information.

If a failure occurs, the secondary Global Manager automatically starts. The secondary Global Manager registers with the InCharge Broker using the name of the primary Global Manager. Clients of the primary Global Manager (such as the Global Console and adapters) that become disconnected, reconnect to the secondary Global Manager.

When the primary Global Manager is again available to monitor the managed environment, a reset script copies the backup repository to the primary Global Manager, shuts down the secondary Global Manager, and restarts the primary Global Manager.

Service Assurance Modules

Several modules can be implemented with InCharge Service Assurance Manager to extend Service Assurance's capabilities. These include:

- InCharge Business Impact Manager
- InCharge Report Manager
- InCharge Web Console
- InCharge Business Dashboard

InCharge Business Impact Manager

InCharge Business Impact Manager (Business Impact Manager) extends the capabilities of Service Assurance to analyze events by calculating the business impact of events and propagating the impacts to affected business entities as discrete notifications that are linked to topology within the managed domain. The impacts are displayed in the Business Services Maps.

To accomplish its functions, Business Impact Manager includes facilities to import business entities, which consist of subscribers and service offerings. Subscriber information may include customers as well as organizations, business units, lines of business, and department entities. Service offerings include business processes. For example, a subscriber can be a customer that subscribes to an IT service offering that provides Internet access.

The imported business information can be also assigned to user-specified groups.

Additionally, Business Impact Manager provides facilities to assign weights to business entities and other elements in your topology. The weights capability allows you to prioritize critical topology and to use the prioritized information when calculating the business impact of events.

InCharge Report Manager

InCharge Report Manager (Report Manager), which includes a Structured Query Language (SQL) Data Interface, extracts notifications from Service Assurance, passes them to an Open Database Connectivity (ODBC) driver, and stores the notification information in a relational database. The database uses a special database schema designed for InCharge notifications.

Notification information can then be extracted from the database and imported into Crystal Enterprise Reports or some other user-selected report application.

The Report Manager includes pre-defined report files (in Crystal format) that can be used to display or print a wide variety of operational, management, and business impact reports.

InCharge Web Console

The contents of the Global Console can also be displayed as a Java applet within a Web Browser. The Web Console capability allows you to connect to an InCharge Manager from any system with a Web Browser and does not require a Global Console installation on the system.

InCharge Business Dashboard

The InCharge Business Dashboard (Business Dashboard) is a flexible, business-oriented alternative to the Web Console. The Business Dashboard displays a collection of InCharge analysis data along side important data from other sources. Each component of the collection of InCharge data is referred to as an InCharge ViewletTM. The collection of viewlets can be loaded into your organization's Web Page and can commingle with important trouble-ticketing information or your company's intranet news. InCharge viewlets can also be embedded within a third-party Web Portal product.

Figure 3 illustrates the architecture of a Web Console and an InCharge Business Dashboard when loaded by a remote user.

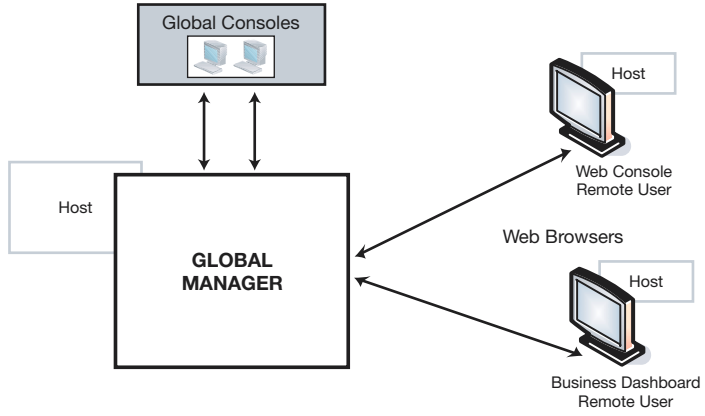


Figure 3: InCharge Business Dashboard Architecture

2

Functional Overview

This chapter provides a functional overview of InCharge Service Assurance Manager and the Service Assurance modules (InCharge Business Impact Manager, Report Manager, Web Console, and Business Dashboard) that can be implemented to extend the functionality of Service Assurance Manager.

Service Assurance Manager Features and Functions

InCharge Service Assurance Manager provides the automated functions and features that are required by today's enterprise and service provider network operations centers. Indeed, its automation, intelligent analyses, and adaptability can significantly reduce both the resources needed for pinpointing and resolving infrastructure problems, and the costs of monitoring and managing distributed networks.

Automatic Topology and Event Consolidation

One of the primary tasks of InCharge Service Assurance Manager is topology and event consolidation. Service Assurance imports infrastructure elements (such as hosts and routers) and applications from each underlying managed domain. As it imports the elements, it consolidates elements that are reported by different sources. Service Assurance also imports the relationships between the elements from the underlying managed domains. Using these relationships and overlapping devices, Service Assurance accurately pieces together a complete topology of the managed environment.

When Service Assurance imports events from the underlying managed domain, they are automatically associated with the elements to which they apply. Notifications received from multiple sources are consolidated into single events. Similarly, impacts reported by different sources for the same problem are deduplicated and associated with the consolidated event in Service Assurance.

Further, to provide business context, InCharge Service Assurance Manager provides a facility that imports customer and service information from provisioning systems and other sources. Using this data, Service Assurance can automatically calculate the customer and service impact for the consolidated events.

Automatic Topology Abstraction

In order to scale to large numbers of underlying systems, InCharge Service Assurance Manager performs topology abstraction. Figure 4 illustrates the difference between a detailed representation and an abstracted representation of network connectivity.

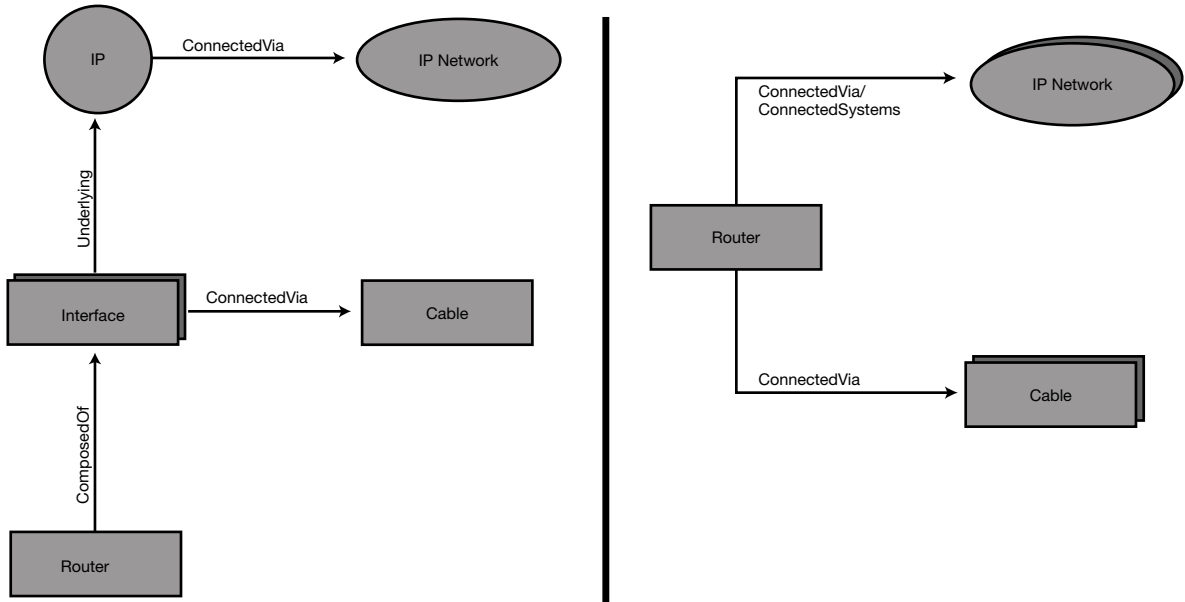


Figure 4: Detailed vs. Abstracted Representation

Abstraction produces a coarse level of topology detail. A system, for example, is viewed as a single entity rather than a collection of its components, and connectivity is between systems as opposed to between components in the system.

Although Service Assurance maintains a coarse level of topology detail, it stores sufficient information for its varied Notification Log, Topology Browser, and Map views. When needed, detailed information can be automatically retrieved from the underlying applications by Service Assurance.

The Global Console

The Global Console provides a focal point through which operations personnel can monitor and manage distributed systems and InCharge administrators can configure and administer InCharge Managers. InCharge administrators control the views, program tools, and access to console operations for InCharge users. The following describes the full functionality of each console. Certain functions require a license and thus may not be included in your InCharge deployment. Also, an InCharge user's access to some console operations may be restricted based on the user's connection privileges and user profile.

For any given event, operations personnel with appropriate access control can take ownership of the event, acknowledge the event, add comments to the audit log of the event, or invoke tools for corrective actions.

The Global Console provides the following console views:

- Notification Log Console
- Topology Browser Console
- Map Console
- Summary View Console
- Status Table Console
- Domain Manager Administration Console
- Global Manager Administration Console

Notification Log Console

The Notification Log Console provides a view of a set of notifications, which is defined by the user profile associated with the user. The notification information can include, for example, the type of event, the element that is affected, and the severity of the event. Operations personnel can potentially open multiple Notification Log Consoles, each customized to display different events, or show multiple lists in a single console, as needed.

Operations personnel can also potentially access the details of the event through the use of the Notification Properties dialog box. The Notification Properties dialog box provides detailed information about a selected notification. The properties include, for example, attributes and values related to this event, elements that are impacted by this event, an audit log of changes in this event's history, or (if this event is a root-cause problem) other events used in the analysis.

The viewable attributes of the displayed events in the Notification Log view (event severity, active event, or first notify, for example) can be customized to meet the needs or preferences of operations personnel. The order in which the attributes are displayed can also be modified. Operations personnel can sort on any number of attributes (whether the attribute column is visible or not) by specifying up to five sorting columns.

The notifications listed in the Notification Log view are color-coded in accordance with the severity of the events. An icon is also used as another indicator of an event's severity.

Topology Browser Console

The Topology Browser Console enables operations personnel to display the managed topology in a tree format and traverse the topology. The console displays InCharge Domain Managers as well as Global Managers. For the selected managed domain, the console displays the classes of elements, instances of each class, and their relationships. Specified elements, indicated by a plus sign (on Windows systems) or a circle (on UNIX systems), can be expanded into instances, properties, or relationships.

When an element in the topology tree is selected, the console displays a corresponding property sheet with tabs for Attributes, Events, and Groups. The tabs, where applicable, include the following information:

- **Attributes:** provides general information about the selected element
- **Events:** for a selected Global Manager, displays the active events that Service Assurance can notify for the element
- **Groups:** provides the current group membership of the element

In addition, the Topology Browser Console provides the Browse Detail menu option. When an element in the topology tree is selected, Browse Detail displays a list of all underlying managed domains that contain that element in their topology. Users can select an underlying managed domain and display it in another Topology Browser view. For hierarchical Service Assurance deployments, users can select Browse Detail as many times as necessary to navigate to the desired domain. Note that Browse Detail is also available for selected notifications in the Notification Log Console and for selected map icons and edges in the Map Console.

Map Console

The Map Console displays, by way of icons and edges, the managed elements in a given environment and the relationships between them. Different types of maps are made available based upon the elements in your managed topology. For example, with InCharge IP Availability Manager, the console displays infrastructure elements in network and connectivity maps. With the addition of Business Impact Manager, the console can also display business services maps that show how the infrastructure elements are associated with business services, as well as the customers that subscribe to those services.

Operations personnel can select elements in the maps and then display detailed information about the elements, such as the ports and/or interfaces contained in a system.

If the status of a given element displayed in the Map Console indicates a problem, operations personnel can view the audit logs of events by way of the Notification Properties dialog box. They can also select and use tools such as on-demand pings and Telnet sessions.

The maps can be customized to meet your needs and/or preferences. For example, custom backgrounds and element icons can be incorporated into the maps.

Summary View Console

The Summary View Console provides overviews or summaries of notifications. The console can contain several summaries that are attached to either the same managed domain or to different domains.

Summaries offer concise, graphical representations of sets of notifications associated with groups of elements. The summary can be depicted as a three-dimensional graph or pie chart. The summary counts indicate the percentages of elements in the group with active events.

The summaries organized by severity are color-coded in accordance with the severity of the events. Otherwise, for other criteria, the colors do not indicate event status.

Status Table Console

A Business Impact Manager user can view a Status Table to quickly determine the overall status of customers and the services being delivered to those customers. In such a Status Table, customers would be represented as the primary set of instances, and the services being delivered to them would be represented as the secondary set of instances.

To describe it more generally, a Status Table Console offers another way to present a concise status of a set of instances. The information displays as a matrix, with a primary set of instances along the Y axis and a secondary (related) set of instances along the X axis. The status of the related instances display, when relevant, at the intersection points in the matrix to reflect the overall status for each primary instance.

The Status Table functionality is very useful for the Business Impact Manager user. The Status Table requires a Web Console or InCharge Business Dashboard license.

Domain Manager Administration Console

The Domain Manager Administration Console enables InCharge administrators to configure and administer the underlying InCharge Domain Managers, and to perform tasks such as:

- Discover topology
- Manage and unmanage elements in the managed topology
- Access the Polling and Thresholds Console to fine-tune parameters of the polling and thresholds settings in the underlying domain

For information about the Domain Manager Administration Console, see the discovery guide that accompanied your InCharge application. Information about polling and thresholds for specific InCharge applications is provided in their respective user's guides.

Global Manager Administration Console

The Global Manager Administration Console enables InCharge administrators to configure Global Managers, including Security Infrastructure Managers (SIMs) and SAM Adapter Platform.

For a selected Global Manager, InCharge administrators create and maintain configuration entities such as notification lists, tools, users, user profiles, access control to console operations, and escalation policies.

For information about the Global Manager Administration Console, see the *InCharge Service Assurance Manager Configuration Guide*.

Service Assurance Functions

The following section describes many of the functions that are integral to the InCharge Service Assurance Manager.

Notification Severity

The InCharge Service Assurance Manager classifies notifications according to their calculated severity.

The notifications listed in the Notification Log Console and the Map Console are color-coded in accordance with the severity of the events. That is, they are color-coded by their seriousness. Icons are also used in the notification log and the maps to identify severity.

The color codes are explained in the following table.






LEVEL	ICON	COLOR	DESCRIPTION
1		Red	Critical: identifies a specific failure that requires resolution.
2		Orange	Major: identifies a serious condition that requires immediate attention.
3		Yellow	Minor: identifies an abnormal condition that is not serious but requires some action.
4		Blue	Unknown: identifies an unknown, unreachable, disconnected, or suspended condition.
5		Green	Normal: the element is in its normal state.

Table 4: Notification Severity Levels

Notification Lists

A Notification List determines the events that are forwarded to a given client. Essentially, the list filters the notifications that are sent from the Global Manager to a client. Additionally, the list, which is configured by the InCharge administrator, can be assigned to one or more user profiles. The personnel assigned to a specified list only see the set of events defined by the list.

The lists could be used to organize, for example:

- Business units
- Geographical regions
- Groups of resources

During day-to-day operations, operations personnel use the Global Console to monitor and manage their areas of responsibility. In doing so, personnel only see the subset of notifications defined for them in the Notification List.

InCharge adapters can also connect to a Notification List, and receive the notifications that match the conditions specified in the list.

For information about Notification Lists, see the *InCharge Service Assurance Manager Configuration Guide*.

Tools

Tools (server, client, and automatic) are programs that are executed by InCharge Service Assurance Manager.

- Server and client tools can be invoked by operations personnel in the Global Console or can be automated using escalation policies. Tools invoked by operators may produce output that can be sent back to the console for display.
- Automatic tools are executed by administrator-specified escalation policies or by adapters. Output is not sent back to the console for display.

Server and client tools are executed in the context of a particular target object. The target object may be a notification, or it may be an infrastructure element such as a router. When invoked from the Global Console, the specification of the target object is implicit.

Automatic tools are executed for notifications that meet the escalation criteria for specified periods of time.

For additional information about the Service Assurance tools, see the *InCharge Service Assurance Manager Configuration Guide*.

Notification Escalation

Escalation is a process that defines a sequence of corrective actions for notifications. Examples of corrective actions include alerting responsible parties and executing automatic tools. InCharge administrators use the Escalation view in the Global Manager Administration Console to configure escalation policies.

Escalation policies enable InCharge administrators to automate responses to events. For example, an administrator can configure an escalation policy to page a shift supervisor if no one takes ownership of a problem for more than 15 minutes. If the problem remains unowned for 30 minutes, the policy will page the operations manager. The administrator can define multiple policies to handle different types of events.

Audit Log

An audit log is associated with each of the notifications that the InCharge Service Assurance Manager receives from the underlying InCharge applications. The audit log includes the following information:

- Event
- Time of the update
- Name of the operations person or system that made the update
- Type of audit entry
- Description of the entry (Notify, Clear, or Suspend, for example)

Service Assurance begins to create an audit log when it receives a notification, and relates the event to an infrastructure element. Thereafter, Service Assurance adds actions for the event, any program tools used for the event, and changes in the status of the event. Actions may include system actions such as archiving and user actions such as acknowledgement and ownership. Comments can be added directly to the audit log.

An audit log for each notification can be viewed in an audit log dialog box using the Global Console, exported to spreadsheet applications, or printed as part of a report. All the audit log entries for individual notifications are stored in one log file on the Global Manager.

Containment

The Containment dialog box provides detailed information about a managed element. Containment information varies depending upon the type of element and the type of analysis being performed by the underlying domain. As examples, for a network connection, the containment information includes details about connection points; for a device managed by IP Performance Manager, containment information includes details about the device's memory.

The Containment dialog box is available for selected notifications in the Notification Log Console, for selected instances in the Topology Browser Console, and for selected nodes in the Map Console. When an element is managed by multiple InCharge Domain Managers, the Containment dialog box includes all the containment information for each domain.

Security

Security is a critical concern in the world of large-scale distributed networks. Therefore, the InCharge Service Assurance Manager provides several means by which InCharge administrators can set up security and control access to the system. This includes:

- User rights and privileges, including client authentication
- Encryption of passwords in files
- Encryption of communication channels

An InCharge administrator can place access restrictions on certain console operations by applying user profiles. Each InCharge user should be associated with a profile that defines the appropriate level of access control (rights and privileges) for their position and job responsibilities.

Client-server connections are controlled on both the client and server sides of the system. The system is secured using authentication records and by assigning connection privileges on the server side. When a client initiates a connection to a server, the client must supply appropriate authentication to the server before the connection (as defined by the connection privileges) is permitted.

For added protection, authentication and other passwords are encrypted in the files that store them.

Communication channels (that is, TCP connections made via SMARTS Remote API) between InCharge servers, brokers, and adapters can also be encrypted. Instead of passing information as clear text, these InCharge components' communications can be encrypted using either a site secret, the Diffie Helman-Advanced Encryption Standard (DH-AES), or both. For new installations, encryption by DH-AES is enabled by default between InCharge processes that support encryption.

For additional information about securing access to InCharge, see the *InCharge System Administration Guide*. For additional information about restricting access to certain Global Console operations, see the *InCharge Service Assurance Manager Configuration Guide*.

Service Assurance Module Functions

The Service Assurance modules provide additional capabilities to calculate the business impact of infrastructure problems, to produce a wide variety of operational and management reports, and to display customer-specific information to a given enterprise or service-provider customer through InCharge Business Dashboard.

InCharge Business Impact Manager Functions

The degradation or failure of important infrastructure elements can slow or stop vital business processes and business services, or dramatically reduce user productivity in needed business areas. InCharge Business Impact Manager ensures maximum availability of services.

InCharge Business Impact Manager (Business Impact Manager) extends the capabilities of Service Assurance to calculate the business impact of events, and to propagate the impacts to affected business entities as discrete notifications that are linked to elements in the infrastructure.

Users can create business entities, such as organizations, business units, lines of business, and departments, and relate them to corresponding infrastructure elements. Users can also create business processes.

In Business Impact Manager, users can assign different weights to any elements in the business or infrastructure topology. Business Impact Manager calculates the impact of root-cause problems by summing up the weights of the impacted elements.

The calculated impact enables operations management to prioritize notifications in accordance with business needs, and to effectively use their time and resources to resolve problems that degrade or threaten vital processes and services.

InCharge Business Process tools are also provided for users to create, update, and delete events associated with their business processes. For example, a user might create an event that represents a telephone call from a supplier who is out of stock of a popular retail product, and then associate the event with the user's Order Fulfillment Business Process.

For detailed information regarding Business Impact Manager, see the *InCharge Service Assurance Manager User's Guide for Business Impact Manager*.

InCharge Report Manager Functions

The InCharge Service Assurance Manager collects a wealth of notification data. To make this data available to operations personnel, InCharge Report Manager can be implemented with Service Assurance Manager.

InCharge Report Manager (Report Manager), which includes a Structured Query Language (SQL) Data Interface, extracts notifications by way of a Notification List from Service Assurance, passes them to an Open Database Connectivity (ODBC) driver, and stores the notification information in a relational database. The database uses a special database schema designed for InCharge notifications.

Notification information can then be extracted from the database, and imported into Crystal Enterprise Reports or some other user-selected report application.

The Report Manager includes pre-defined report files (in Crystal format) that can be used to display or print a wide variety of operational and management reports. The pre-defined report files include:

- Day-to-Day Operations Reports
- Operations Management Reports
- Maintenance Reports
- Business Impact Reports

Day-to-Day Operations Reports

The notification data stored by Service Assurance can be used to generate a variety of reports that are helpful for day-to-day operations. For example:

- An open event report that lists all active events, sorted by duration
- A critical customers report that summarizes availability by customer and highlights those customers with the lowest availability
- A critical devices report that allows operations management to review operations performance and identify hot spots in the infrastructure (from a failure perspective)

Operations Management Reports

The notification data can be used to generate management reports that provide high-level views of service quality and staff performance. For example:

- An operator workload report that lists the workload of operators through their ownership of active notifications
- A post mortem report that lists recently cleared events, sorted by duration
- An acknowledged events report that lists active, acknowledged root-cause events
- An unassigned events report that lists events that no one owns
- All active and inactive events for a specific element, showing the overall health of the element

Maintenance Reports

The reports can be used to help identify problem equipment. For example:

- An availability report that summarizes the availability of all devices or just the devices of a specified class
- A recurring problem report that lists those events with the most occurrences and/or greatest total impact for a period of days, and highlights the most affected elements

Business Impact Reports

InCharge Business Impact Manager users also have pre-defined reports that track critical business entities in the network. For example:

- A critical business users report that shows the availability of devices by customer
- A critical business processes report that shows the availability of a customer's business processes

InCharge Business Dashboard Functions

The InCharge Business Dashboard (Business Dashboard) displays views normally available from the Global Console as a collection of InCharge viewlets within your organization's Web Page or a third-party Web Portal. InCharge viewlets can display a variety of InCharge information including an InCharge Notification Log, Status Table, Map, Summary, Notification Properties, or Containment View. Viewlets can also be customized to suit your needs. For example, an InCharge map viewlet can be set up to show a specific topology instance as the focus of the map display.

Furthermore, the viewlets can function as *sources* for broadcasting context information to other, *listener* viewlets. For example, a Status Table viewlet and a Notification Log viewlet can be displayed such that selections in the Status Table result in the Notification Log showing notifications related to those Status Table selections.

3

Implementation Scenarios

This chapter highlights important features of InCharge solutions, and describes how InCharge Service Assurance Manager can be implemented for a competitive advantage in two business areas:

- Enterprise Service Provider
- Network Service Provider

The Challenges of Network Management

Regardless of the business area, network management organizations everywhere are faced with the following challenges:

- Improve service
- Reduce operational costs
- Integrate new tools with existing management and support systems
- Deliver a high return on investment

InCharge Solutions

The features and functions of the InCharge solutions, which include InCharge IP Availability and Performance Managers, InCharge Application Services Manager, InCharge ATM/Frame Relay Manager, and InCharge Service Assurance Manager, address important challenges that network management organizations face on a day-to-day basis.

Fast and Accurate Fault Isolation

InCharge uses comprehensive topology models to quickly and accurately analyze and isolate failures in networks of any size and complexity.

InCharge analysis improves service by greatly reducing manual problem isolation, which accounts for up to 80 percent of total downtime. The analysis also lowers operational costs by reducing the human effort involved in isolating problems, as well as the effort involved in chasing down all the symptomatic events and false alerts.

Automated Corrective Actions

Once a fault has been accurately isolated, Service Assurance can be configured to initiate automated responses to correct soft faults or to reroute services around failures. Because InCharge can separate root-cause problems from symptomatic events and false alarms, actions are only invoked when or where needed. With InCharge's topology models, corrective actions can be invoked against both the failed component and/or any impacted services.

Service Assurance's automated actions avoid service down time and provide virtually immediate service restoration. They can also improve service by fixing problems before users become impacted.

Business Focus

InCharge Service Assurance Business Impact Manager can import business information directly from existing data sources such as provisioning systems. During its analysis, it places infrastructure problems in their proper business context and analyzes their impact on services, business processes and customers. This enables managers to focus their efforts on the problems with the highest business impact.

Integration

InCharge solutions are designed to integrate with management tools and other operational support systems. InCharge leverages management data from third-party sources while providing console access to third-party management applications. InCharge's ability to distill countless events into a concise set of defined problems and exceptions, makes it a natural integration point for problem management (ticketing) systems.

Service Assurance's integration with other management applications lowers operational costs by providing users with a single, consistent, intuitive interface for viewing all management data. At the same time, Service Assurance improves operational control by presenting a concise display of network problems in their full topology context, complete with their impacts and histories.

Rapid Deployment and Low Maintenance

InCharge solutions are designed for rapid deployment and low maintenance. Unlike other management solutions, InCharge's comprehensive set of problem and impact models automatically adapt to the configuration of the network infrastructure—providing immediate results. This same adaptability enables InCharge solutions to automatically keep pace with future changes in the infrastructure without the need for expensive on-going code maintenance.

The key to InCharge's ability to automatically adapt to changes is the use of ICIM models that represent the various elements of the infrastructure, how they relate to each other, and how they can affect each other. InCharge solutions then apply these models to the discovered elements in a given network to provide problem and impact analysis specific to that network. Furthermore, customers who need additional functionality can leverage these models to build solutions that also adapt automatically to change.

This enables InCharge solutions to provide better return on investment than other management solutions:

- Automatic adaptation reduces the head-count needed to maintain the management solution
- Analysis that automatically adapts to changes in the environment, provides more accurate results which reduces service downtime
- More accurate analysis frees up expensive engineering resources to work on more strategic initiatives

Enterprise Provider

A diversified financial services firm deployed an InCharge Service Assurance solution to help them manage their complex infrastructure as an integrated system rather than as sets of unrelated silos.

The primary concern of the financial enterprise was the more than 100 mission-critical applications used by their business units, such as applications to monitor their exposure to interest and currency fluctuations. Basically, the enterprise had too many mission-critical applications for the network teams to track. At the same time, their network changed and evolved so quickly that the application teams could not stay abreast of the changes.

As a result, when network failures occurred, or when network maintenance was required, they had no way of knowing which applications were affected. Attempts to do this with traditional tools—where one specified network dependencies for each application—failed because of the need to manually maintain the correlation logic every time the network topology changed. If they missed a change, the correlation would fail.

By deploying an InCharge solution the enterprise was able to solve their problem by separating the network, applications, and business analysis into separate domains, thus breaking the problem into manageable pieces, as well as automating the most complicated part of their problem: defining the network dependencies of the distributed applications. Their InCharge solution consisted of the following:

- InCharge IP Availability Manager and IP Performance Manager: to monitor failures in the network infrastructure and identify the affected systems, automatically calculating the affect of any network path redundancies
- InCharge Application Services Manager: to perform root-cause and impact analysis of distributed applications based on events and topology information imported from the IP Availability Manager, IP Performance Manager, and the SAM adapters
- InCharge Business Impact Manager: to correlate failures in the technology infrastructure to the businesses they impact (for example, processing on NASDAQ trades)
- InCharge Service Assurance Manager: to bring it altogether into a single system, where users can get customizable views of the data they need, and use the appropriate tools to quickly restore service

- InCharge Business Dashboard: to provide Web-based, personalized views for business unit managers (for example, in the foreign exchange unit) showing a map representation and a summary view of the status of their systems

The following figure illustrates their InCharge implementation.

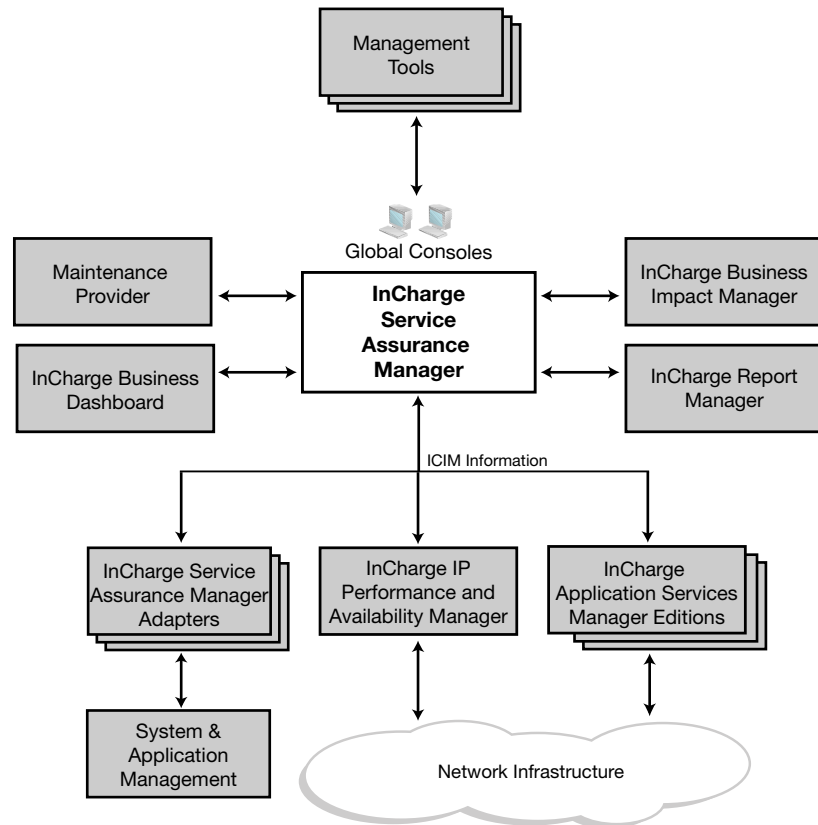


Figure 5: Enterprise Solution

By connecting the analysis from the network, application, and business domains, InCharge Service Assurance Manager provided the enterprise with an end-to-end view of causes and impacts—automatically correlating network failures with their impacts on applications and critical business processes. For example, it showed that a switch failure blocked access to a Solaris system that ran one of the two Oracle databases that supported their accounts receivable application. This resulted in degraded performance of the accounting application, and placed their ability to complete their quarterly financial reporting on time at risk.

By knowing the business impact of each problem, the operations staff effectively prioritized their support efforts on the most critical problems; that is, they aligned their efforts with the overall business objectives of the enterprise.

At the same time, because InCharge IP Availability Manager and IP Performance Manager automatically adapt to changes in the network topology, operations did not need to devote teams of people to modify the analysis every time the network topology changes. This dramatically reduced the cost to maintain their management systems. In fact, because all of the logic is based on the infrastructure topology, they only needed to manually maintain the business and application elements. InCharge automatically adapted everything else: root-cause and impact analysis, personalized views, and so forth.

In addition to solving the problem of application and business impact, the InCharge Service Assurance Solution also streamlined operational processes.

By identifying the root causes, the support staff eliminated most of the time-consuming fault isolation process and immediately proceeded to problem resolution. By identifying which events are impacts of other problems, the support staff avoided wasting time trying to chase down and fix symptoms of other problems. Finally, by relating the root causes with the impacts, operations staff streamlined communications. For example, when estimating the time to resolve a root-cause problem, that information was automatically propagated to all affected systems, applications, and business processes.

Because they identified the actual root-cause failures (for example, a card on a switch), they were able to automate the dispatch of service technicians from their maintenance provider. More importantly, because they positively identified the failed element, they avoided the delays caused by technicians who arrived on site with the wrong parts.

By integrating the InCharge solution with their existing system and application management tools (by way of SAM adapters), the enterprise was able to leverage their previous investments in management tools and accelerate the deployment of the overall solution.

Network Service Provider

A large network service provider had been using traditional management tools to manage a broad array of services. After several years of deployment and custom work, the systems were starting to improve network operations. However, the maintenance costs were spiralling out of control and it was becoming ever more difficult to keep up with changes in the managed environment. Worse, the operational improvements were not translating into higher customer satisfaction because of communications failures between operations and the call center. The provider needed to find an alternative that could deliver real improvements to customer satisfaction while reducing operational costs. The answer to this challenge was an InCharge Service Assurance solution composed of:

- InCharge ATM/Frame Relay Manager
- InCharge IP Availability Manager and Performance Manager
- InCharge Application Services Manager
- SAM adapters
- InCharge Business Impact Manager
- InCharge Service Assurance Manager
- InCharge Business Dashboard
- InCharge Report Manager

Figure 6 illustrates the solution.

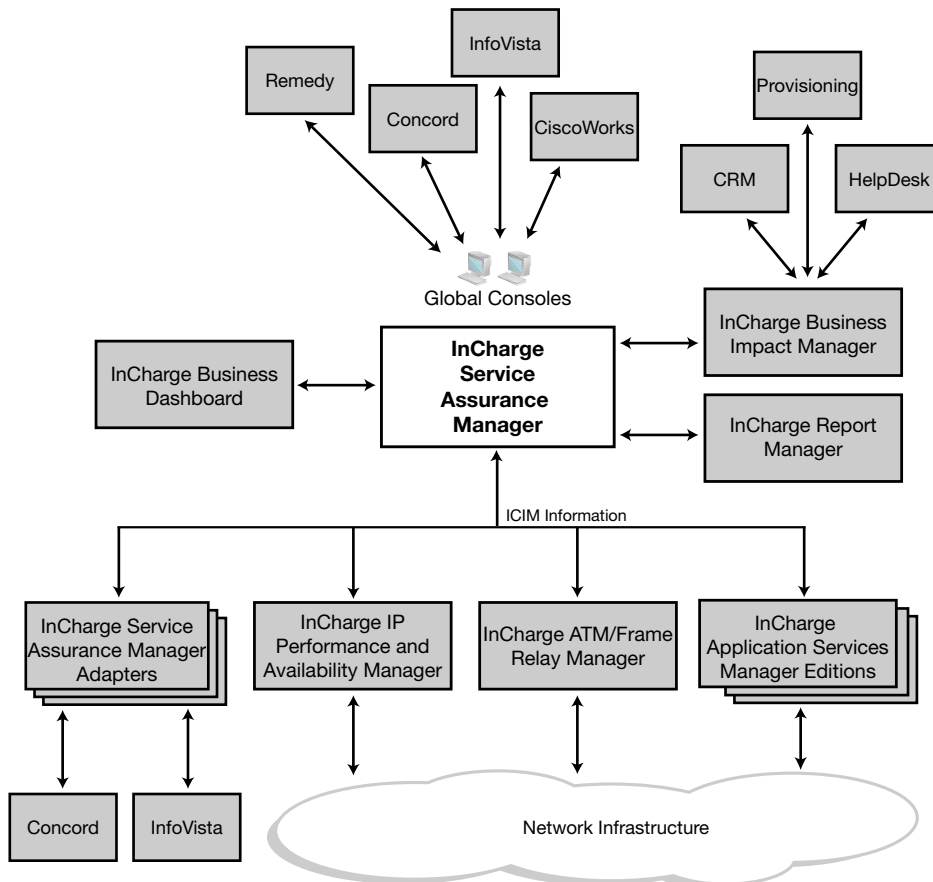


Figure 6: Network Service Provider Solution

With InCharge's autodiscovery, built-in analysis, and policy-based management, operations was able to immediately identify and isolate root-cause failures in their networks. Because InCharge applications automatically detect and adapt to changes in topology, the service provider no longer needed to dedicate teams of consultants to maintain them. Also, because InCharge intelligently manages networks with overlapping IP addresses (for example, private IPs), the provider could discontinue the expensive process of dedicating a separate management system to each customer. These features helped the provider to dramatically reduce the cost of managing their environment.

By integrating the InCharge solution with existing management tools (for example, system and application agents from Concord), the service provider was able to use its existing investments to cut deployment time.

InCharge Service Assurance's unique ability to integrate not just events, but events in the context of a comprehensive topology, allowed the service provider to more effectively integrate operations with its other OSS applications. By integrating with their provisioning system, the provider was able to automatically build their business topology, and relate customers to services and services to elements in their network topology. This integration provided automated business impact analysis for prioritization, and allowed users to view technology failures in their complete technical *and* business context.

Leveraging this business topology, InCharge was able to automatically identify which events customers would care about so that the call center could focus on customer impacts rather than sifting through masses of arcane infrastructure events. Similarly, by using the customer data to integrate with the CRM application, InCharge was able to identify the account managers associated with each customer impact, and notify them of problems in real time. Furthermore, the operations staff used this information to coordinate maintenance work with the account managers of potentially affected customers.

Because problem causes and impacts were linked, the provider was also able to streamline communications between operations and the call center. For example, when operations identified a problem and dispatched an engineer to resolve it, they could estimate a repair time and the system automatically relayed that estimate for all customer impacts to the call center and customer web applications so that everyone immediately knew when the service would be restored. Finally, when customer relations faced a crisis and the customer assurance staff elevated the priorities of specific customer impacts, InCharge automatically applied the priority changes to the root-cause failures and notified engineering management so that operations could shift their activities accordingly.

With the Business Dashboard, the provider's customers were able to get real time views of their data. Because these views use the same topology, the views changed automatically whenever the topology changed. This, too, reduced the cost of servicing customers.

In conclusion, by effectively integrating the InCharge solution with its existing applications (for example, provisioning, CRM and call center), the service provider was able to show a more professional face to its customer. In the past, customer calls to the call center typically resulted in an operator taking messages, calling around operations to see what was happening, and then calling the customer back—a time consuming process that often left the customer wondering what the provider was doing. Now, when the customer calls, the call center is not only aware of the problem, but is also able to give the customer up-to-the-minute information about the status of the problem and its resolution.

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