



# Solution Management

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## Introduction

The following sections describe the management architecture, the element management systems (EMSs), and the management tools for the Cisco Multiservice Packet Network Solution:

- [Management Architecture](#)
- [Element Management Systems](#)
- [Management Tools](#)

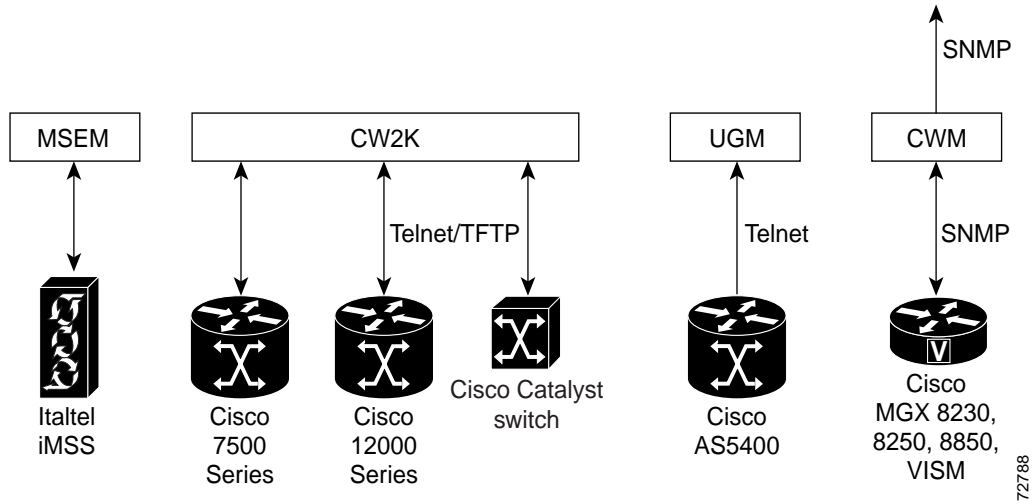
## Management Architecture

For releases 2.0 and 2.1 of the Cisco Multiservice Packet Network Solution, configuration, performance, fault, and accounting management is provided within the relevant EMSs.

The configuration management functions enable the planning and installation of network elements and their interconnection into a network, and the activation, modification and deletion of customer services that use that network.

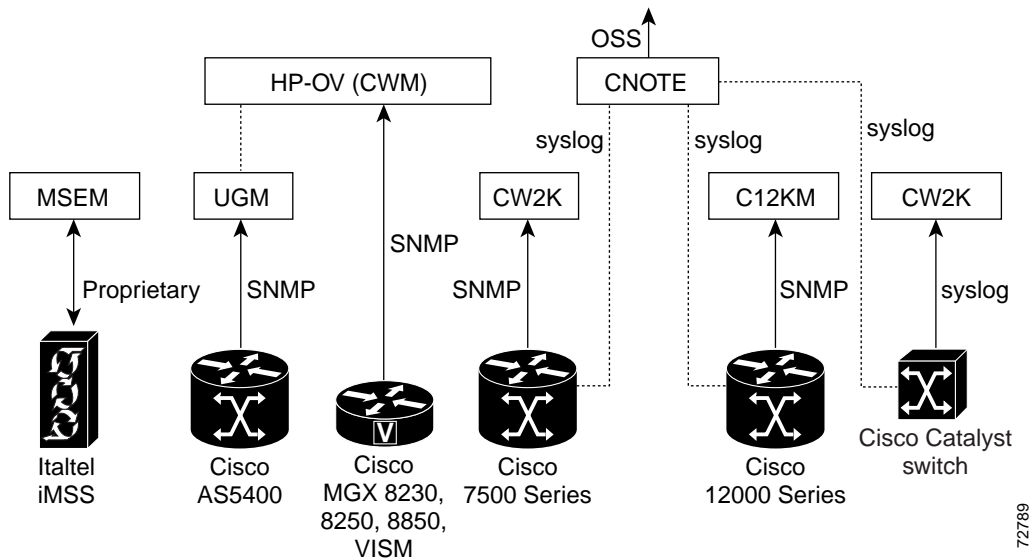
The performance management functions evaluate and report on the effectiveness of the network and network elements for the support of services. The focus within performance management is the collection and analysis of statistics for the call agents, media gateways, and routers. The call level statistics, traffic flows for traffic engineering, and measurements at the edge routers generate a series of specialized reports that provide an indication of the core network performance and how this impacts voice traffic.

Figure 3-1 Configuration and Performance Management—Element View



The fault management functions enable the detection, isolation, and correction of abnormal operation of the network. Each of the individual EMSs captures fault information, and HP OpenView Network Node Manager (NNM), delivered with Cisco WAN Manager (CWM), can optionally be used with the media gateways. Fault management for the Cisco IOS devices (for example, the Cisco 7500 and 12000 series Internet routers and Catalyst switches) uses the Cisco CNS Notification Engine (CNOTE) to forward Syslog messages to operations support systems (for example, Cisco Info Centre). These routers and switches can also optionally use the HP OpenView NNM for fault management. The HP OpenView NNM, together with the Fault and Trouble Management component of the Italtel Multiservice Element Manager (MSEM), provide an overall network-wide view, or can be used to monitor subdivisions of the Cisco Multiservice Packet Network Solution (for example, core, access, media gateways, and call agent) as required.

Figure 3-2 Fault Management—Element View



Within the Cisco Multiservice Packet Network Solution, accounting management, to enable the use of the network services to be measured and the costs for such usage to be determined, falls within the domain of the call agent management system MSEM.

See [Table 3-1](#) for a summary of the EMSs for the media gateways and call agents supported as part of the Cisco Multiservice Packet Network Solution.

**Table 3-1 Media Gateway and Call Agent Element Management Systems**

Solution Component	Configuration Management	Fault Management	Performance Management
Cisco MGX 8230, 8250, and 8850 with VISM	Cisco WAN Manager	Cisco WAN Manager (optional: HP OpenView NNM)	Cisco WAN Manager
Cisco AS5400 and AS5400HPX Universal Gateways	Cisco Universal Gateway Manager	Cisco Universal Gateway Manager (optional: HP OpenView NNM)	Cisco Universal Gateway Manager
Italtel iMSS-4040 and iMSS-4050 call agents	Multiservice Element Manager: Service Configuration Management	Multiservice Element Manager: Fault and Trouble Management	Multiservice Element Manager: Traffic and Performance Management

See [Table 3-2](#) for a summary of the EMSs that could be used with the core and access routers and switches.

**Table 3-2 Media Gateway and Call Agent Element Management Systems**

Solution Component	Configuration Management	Fault Management	Performance Management
Cisco 12000 series Internet routers	Cisco 12000 Manager	CNS Notification Engine (optional: HP OpenView NNM)	Cisco 12000 Manager
Cisco 7500 series routers	CiscoWorks 2000 Routed WAN Management Solution	CNS Notification Engine (optional: HP OpenView NNM)	CiscoWorks 2000 Routed WAN Management Solution
Catalyst 3500 series switch, Catalyst 4000 series branch office switch, and Catalyst 6000 multilayer switch	CiscoWorks 2000 Routed WAN Management Solution	CNS Notification Engine (optional: HP OpenView NNM)	CiscoWorks 2000 Routed WAN Management Solution

## Element Management Systems

Element management systems are available for each of the components of the solution. See [Table 3-3](#) for a summary of these systems.

Management of the Cisco MGX 8230, 8250, and 8850 platforms with the Voice Interworking Service Module (VISM) is provided by CWM, with HP OpenView NNM as an optional component.

Management of the AS5400 and AS5400HPX gateways is provided by the Cisco Universal Gateway Manager (UGM).

Management of the call agent components is provided by the Italtel-supplied MSEM applications: Service Configuration Manager (SCM), Fault and Trouble Manager (FTM), Traffic and Performance Manager (T/PM), and Billing Manager.

Management of the data core components can be provided by the Cisco 12000 Manager (C12KM), and management of the access switches and routers can be provided by CiscoWorks 2000 (CW2K) Routed WAN Management Solution, with the Resource Manager Essentials (RME) application. Note that configuration management for the switches is optional within the Cisco Multiservice Packet Network Solution because the switches have static configurations.

**Table 3-3** *Element Management Systems*

Element Management System	Manages	Linked Management Components
Cisco WAN Manager	Cisco MGX 8230, 8250, and 8850 with VISM	HP OpenView Network Node Manager (optional) CiscoView
Cisco Universal Gateway Manager	Cisco AS5400 and AS5400HPX Universal Gateways	Cisco Element Management Framework
Italtel Multiservice Element Manager	Italtel iMSS-4040 and iMSS-4050 call agents	Service Configuration Manager Fault and Trouble Manager Traffic and Performance Manager Billing Manager
Cisco 12000 Manager	Cisco 12000 series Internet routers	Cisco Element Management Framework
CiscoWorks 2000: Routed WAN Management Solution	Cisco 7500 series routers and Catalyst switches	CiscoView Resource Manager Essentials

The C12KM and UGM are integrated within the Cisco Element Management Framework (CEMF)—the foundation element management layer of the Cisco Service Management (CSM) system. CEMF provides common interfaces and management services for the element management applications, including an easy-to-use graphical user interface that isolates the end operator from the complexities of Cisco IOS software and the Simple Network Management Protocol (SNMPS). In addition, CEMF provides a standard set of external interfaces that enable higher-level network and service management applications to be integrated and enabled.

Refer to the *Cisco Multiservice Packet Network Solution Documentation Guide* for a list of the relevant product documents for CEMF.

The rest of this section provides further information for the following EMSs:

- [Cisco WAN Manager](#)
- [Cisco Universal Gateway Manager](#)
- [Multiservice Element Manager](#)

- [Cisco 12000 Manager](#)
- [CiscoWorks 2000: Routed WAN Management Solution](#)

## Cisco WAN Manager

The CWM is a suite of WAN multiservice management applications that provides configuration, performance, and fault management for the Cisco MGX 8230, 8250, and 8850 platforms with the VISM.

The CWM is shipped with WAN CiscoView. This GUI-based device management software application allows you to display a graphical representation of the Cisco MGX 8230, 8250, and 8850 platforms, display configuration and performance information, and perform minor configuration and troubleshooting tasks.

- **Configuration Management:** The Connection Manager allows you to add, modify, and delete end-to-end connections; you can establish connections automatically by selecting the desired connection end-points and configuring the connection type and class of service. The Service Class Template Manager allows you to configure the VISM cards used in the Cisco Multiservice Packet Network Solution. The Network Configurator allows you to add new nodes, or modify or delete existing nodes. It also provides descriptor information, node name, and IP address information for the nodes in your network.
- **Performance Management:** The Statistics Collection Manager allows you to control and manage statistics collection; a forms-based interface establishes and modifies statistic collection policies, such as which statistics to collect, and collection interval periods for a node, port, or private virtual circuit. Wide ranges of statistics are available at the port and virtual channel level to support operations and maintenance, customer network management and usage-based billing. Although VISM does not yet forward historical statistical information, access to the real time counters on the VISM is provided through CiscoView.
- **Fault Management:** CWM can optionally operate with HP OpenView NNM to provide fault management for the switch (refer to the “[HP OpenView Network Node Manager](#)” section). The Event Manager in CWM and the HP OpenView Event Browser filter events (by a combination of event type, source, message string, time received, and severity), group events into categories based on severity, and act on events based on custom-defined operator actions.

The Network Browser provides a hierarchical representation of network information in a table format, based on either a physical or logical relationship among the various network elements, and the Security Manager provides controlled access to multiple users of CWM, based on the unique user ID and password.

Refer to the *Cisco Multiservice Packet Network Solution Documentation Guide* for a list of the relevant product documents for CWM.

## HP OpenView Network Node Manager

HP OpenView NNM provides network views in an intuitive graphical format. It discovers network devices and provides a map to illustrate the structure of the network and the status of devices and segments. When a major device fails, the event correlation engine evaluates the event stream to pinpoint the root cause of the failure. Other capabilities help you prevent problems by identifying potential trouble spots before a failure occurs, allowing you to manage the network more intelligently, thus leading to increased network up-time and lower costs.

The OpenView Event Management System provides a framework for the display of alarms. OpenView identifies problems fast through an advanced event correlation engine, immediately pinpointing the root cause of network problems, while also displaying all of the contributing events for each of the alarms. Out-of-the-box correlation circuits are included for some of the most common network management problems.

The HP OpenView Web Launcher allows access from anywhere; a login facility with password authentication ensures the security of management data.

Out-of-the-box reports present trends on performance, availability, inventory, and exceptions. Analysis of this historical data provides a clear picture about the devices in the network and allows you to become more proactive in managing faults.

The OpenView Alarm Browser provides a convenient central location for monitoring critical events on your network. The Alarm Browser sorts the alarms into categories and dynamically filters the alarm list (for example, by node) to make the information more useful. Alarm categories used are as follows: Error, Threshold, Status, Configuration, Application Alerts, and All. The Alarm Browser can also manage the alarm process by acknowledging that the problem causing an alarm is being addressed, deleting alarms from the list after they are resolved, and specifying additional actions that can be executed upon selected alarms.

Refer to the *Cisco Multiservice Packet Network Solution Documentation Guide* for a list of the relevant product documents for HP OpenView NNM.

## Cisco Universal Gateway Manager

The UGM, within the CEMF, provides configuration, performance, and fault management for the Cisco AS5400 and AS5400HPX Universal Gateways.

- **Configuration Management:** UGM provides various configuration services for the gateways and their components. As objects are configured or modified, the database is updated automatically to reflect the current configuration of the network.
- **Performance Management:** UGM allows you to collect performance information from each gateway and its components. The Performance Manager allows you to monitor the network by creating graphical views of this performance data.
- **Fault Management:** UGM provides device- and port-specific alarm frequency and severity information. The Event Browser supports point-and-click alarm acknowledgement and clearing functions, and also enables trap forwarding.

UGM supports role-based access to its management functions, with the Access Manager allowing you to define user groups and assign users to these groups, and also support control of administrative state variables for UGM resources.

Cisco UGM runs on a Sun Solaris platform and accesses standards-based information through SNMP, Telnet, and FTP/TFTP.

Refer to the *Cisco Multiservice Packet Network Solution Documentation Guide* for a list of the relevant product documents for UGM.

## Multiservice Element Manager

MSEM provides configuration, performance, and fault management for the Italtel iMSS-4040 and iMSS-4050 call agents, with the capability to manage up to 50 Italtel Multiservice Switching System (iMSS) call agents. MSEM interacts with the Operation and Maintenance Server (OMS) to manage the Optical Peripheral Module (OPM) and Protocol Handling Server (PHS) components of the iMSS and to perform its element and network management functions.

OMS is the operator interface to the OPM and PHS components of the exchange, allowing local and remote management through a linked Windows NT console. OMS functions include software download and start-up management, exchange upgrade management for maintenance activities such as switchover, and built-in alarm collection and troubleshooting diagnostics (checking faults for consistency and translating into diagnostic reports). OMS provides an interface to MSEM.

MSEM is the centralized system for the operation, administration, and maintenance of the iMSS call agent, providing automatic collection of billing and traffic data, alarm management (collection, filtering, correlation, and user alerting), and transmission of service provisioning and configuration data. MSEM supports exchange operations such as remote transfer and remote activation of software patches and voice announcements, date-time monitoring and synchronizing between MSEM and iMSS, transparent access to the iMSS to allow data queries and modification, and scheduling of iMSS command batch broadcasting.

MSEM provides management in four key areas, as follows:

- Service Configuration Management (SCM)
- Fault and Trouble Management (FTM)
- Traffic and Performance Management (T/PM)
- Billing Management

MSEM also provides proprietary interfaces to external Operations Support Systems (OSSs) and other external billing systems.

Refer to the *Cisco Multiservice Packet Network Solution Documentation Guide* for a list of the relevant product documents for MSEM.

## Cisco 12000 Manager

The C12KM, within the CEMF, delivers a range of provisioning, configuration, fault isolation/analysis, inventory, and capacity management tools for the Cisco 12016 and 12416 Internet routers in the core of the Cisco Multiservice Packet Network Solution.

- **Provisioning:** The C12KM provides auto discovery and auto synchronization of the physical devices with the CEMF object model and repository, provisioning the Cisco 12000 series Internet routers prior to installation, and then automatically detecting and beginning management upon physical installation and configuration.
- **Configuration Management:** The C12KM provides save, restore, and configuration editor functions (for setting the node, card, and port parameters), manages the Cisco IOS Software, and controls image downloads. The system allows concurrent operations to multiple Cisco 12000 series Internet routers and bulk application of profiles for common POS interface set-ups. The system contains a browser for MIBs, and provides an application programming interface (API) for integration through the CEMF Common Object Request Broker Architecture (CORBA) gateway.

- **Fault Management:** The C12KM provides comprehensive fault management at the chassis, card, and port levels, through a set of event management filtering, grouping, thresholding, and notification escalation tools. The event/alarm browser tracks all events and alarms related to the Cisco 12000 series Internet routers, displaying the status of the core network via color-coded icons. Dialog screens show availability details, including uptime and last change time of chassis and cards, with a color-coded LED status for the chassis, cards, and ports.
- **Performance and Accounting Management:** The C12KM collects and stores performance and traffic information from the Cisco 12000 series Internet routers, and can view the performance statistics of a selected interface by attribute within a specific time period. The system can archive performance data in comma-separated value (CSV) format, and forward information through a northbound interface to higher-level applications (such as applications for billing).

Refer to the *Cisco Multiservice Packet Network Solution Documentation Guide* for a list of the relevant product documents for C12KM.

## CiscoWorks 2000: Routed WAN Management Solution

The CW2K: Routed WAN Management Solution provides applications for configuring, administering, monitoring, and troubleshooting the Cisco 7507 and 7513 routers, and the Catalyst switches in the Cisco Multiservice Packet Network Solution. The application provides visibility into network behavior, identifies performance bottlenecks and long-term performance trends, provides configuration tools to optimize bandwidth and link utilization, and receives and analyzes information collected by remote monitoring (RMON) devices.

The Cisco Multiservice Packet Network Solution uses CiscoWorks 2000 CD One, 4th Edition. This includes CiscoView, a graphical SNMP-based device management tool that provides real-time views of networked Cisco Systems devices. These views deliver a continuously updated physical picture of device configuration and performance conditions, with simultaneous views available for multiple device sessions.

Refer to the *Cisco Multiservice Packet Network Solution Documentation Guide* for a list of the relevant product documents for CiscoWorks 2000 CD One, 4th Edition.

Configuration management of the routers and switches in the Cisco Multiservice Packet Network Solution uses the Resource Manager Essentials (RME) application within CW2K.



### Note

The CW2K Internetwork Performance Monitor (IPM), Access Control List (ACL) and NetScout nGenius Real-Time Monitor (RTM) applications are not used in releases 2.0 and 2.1 of the Cisco Multiservice Packet Network Solution.

## Resource Manager Essentials

The RME application provides configuration, inventory management, syslog and change reporting, and software image management for the routers and switches in the Cisco Multiservice Packet Network Solution.

RME allows you to collect the monitoring, fault, and availability information needed to track devices critical to the network uptime and application availability. RME also provides tools that you can use to rapidly and reliably deploy Cisco software images and view configurations of the routers and switches, and, together with Cisco.com service and support, automate software maintenance.



RME is based on a client/server architecture that connects multiple web-based clients to a server on the network. As the number of network devices increases, additional servers or collection points can be added to manage network growth with little impact on the client browser application. By taking advantage of the scalability inherent in the intranet architecture, RME supports multiple users anywhere on the network.

Refer to the *Cisco Multiservice Packet Network Solution Documentation Guide* for a list of the relevant product documents for RME.

## Management Tools

For releases 2.0 and 2.1 of the Cisco Multiservice Packet Network Solution, the key network management tool is CNOTE.

## CNS Notification Engine

CNOTE is a high-performance fault management gateway that receives Syslog messages from IOS devices and converts them into SNMP v1 or v2c traps, which are forwarded to OSSs (for example, Cisco Info Centre) that have registered with CNOTE. During trap conversion, the CNOTE adds additional information to the traps, such as slot number and port number thus enriching the information contained in the network event messages. This added information makes it easier for OSS fault management applications to perform event deduplication and fault correlation operations.

In addition, the CNOTE gateway improves network monitoring by delivering a robust trap stream to recover nonreliable User Datagram Protocol (UDP) traps when they get lost in the network. Multiple OSS clients can register themselves with a single CNOTE gateway using category trap filters to receive different streams of events, and the gateway provides a set of user-defined trap suppression and severity overwrite rules to manage the network.

Using the CNOTE gateway as an event source, fault management systems can manage the Cisco 12000 series Internet routers, Cisco 7500 series routers, and Catalyst switches in the Cisco Multiservice Packet Network Solution. In addition, CNOTE can receive events from Route Processor Modules (RPMs).

Refer to the *Cisco Multiservice Packet Network Solution Documentation Guide* for a list of the relevant product documents for CNOTE.

