Voice Health Monitor Overview

These topics provide an overview of the VHM application:

Overview of VHM

VHM helps network administrators and network operators determine and maintain the stability of the VoIP network within their enterprise. VHM achieves this goal by using:

- A series of availability and health checks on the VoIP equipment in the network.
- A fault detection and escalation system to notify the users of any faults or exceptions detected.

VHM integrates with network management systems (NMSs) such as HP OpenView Network Node Manager.

With VHM, you can:

- Discover VoIP network devices and applications on a user-entered schedule
- Monitor faults in voice and data networks
- Run synthetic transaction tests, to check Cisco CallManager functions
- Check the availability and health of VoIP equipment and applications
- Obtain the status of each voice device group, such as Voice Cluster, Voice Gateway, Phone Access Switches, and Work Flow Applications
- Discover and manage Ethernet ports that have IP Phones connected to them
- Monitor IP phones in the network

How VHM Works

VHM manages the voice-specific devices in the network by polling information from managed devices, as well as processing SNMP Traps generated by the devices. VHM relies on DFM to receive the SNMP Traps. VHM does not duplicate queries for information collection, but shares the information collected by DFM.

Any polling analysis done in DFM can be leveraged by VHM. When polling devices, DFM monitors generic parameters, while VHM monitors voice-specific parameters. When VHM is used in conjunction with DFM, users can detect generic faults that are causing VoIP disruptions.

VHM correlates the collected information and generates events on voice components that can be viewed in the Monitoring Console or on the Real-Time Dashboard. Users can also view device level faults in the DFM Monitoring Console. Alarms for both VHM and DFM can be seen from the Monitoring Console.

VHM and DFM share many features as well as some components of their architectures. VHM and its commonality with DFM are described in more detail in the "VHM and DFM Interdependencies" section on page 1-4.

Event Correlation in VHM

Two types of events are generated by VHM: Compounds and Symptoms. One or more Symptoms generate Compound or aggregated events. Symptoms are faults, such as Power Supply Down or Temperature Too High, which generate Environment Exceptions. Events are generated when fault conditions are detected and the event correlation cycle is reached. The event correlation cycle in VHM occurs every 30 seconds.

An example of an event correlation in VHM is TooManyInActivePhones. This event is generated when phones registered with call managers in a cluster become inactive and cross the InActivePhoneThreshold over a number of active phones. In this event, all the call managers in the cluster are monitored to find out the total number of phones that became inactive and compare that number with the total number of active phones in the cluster.

VHM and DFM Interdependencies

Note For all DFM references in this guide, refer to the *User Guide for Device Fault Manager* for more detailed information.

Device Fault Manager (DFM) and VHM both analyze Cisco device failures. The two products often identify problems before users of network services realize that a problem exists. Both VHM and DFM:

- Use a top-down approach that starts with users identifying problems and their symptoms:
  - Identify the problems affecting managed systems that are critical to correlate.
  - Describe the symptoms, developing a “problem signature” that specifies which conditions are present in a faulty element when the problem occurs.
- Create a causality mapping between the problems and the symptoms. Problems and symptoms are coded in correlation models that VHM and DFM use to:
  - Analyze network conditions.
  - Generate faults and exceptions.

The event information necessary to diagnose problems is present in the correlation model. Therefore, VHM and DFM monitor only the events necessary to diagnose problems.

Table 1-1 lists the interdependencies between VHM and DFM.

Table 1-1 Interdependencies between VHM and DFM

Component or Feature	Description of Dependency
DFM Installation	A DFM version, which is compatible with VHM, must be installed either on the same system as VHM or on a remote system where it is network accessible to VHM. See *Installing and Setting Up Voice Health Monitor on Windows 2000* for server system requirements.
DFM Broker	The DFM Broker maintains a list of active domain managers running on the network and registered with the DFM Broker. Domain managers are fault management server processes such as VHM and DFM. Each domain manager is identified by name and the IP address and port the domain manager is running on. The VHM installation process can find the DFM Broker if it is installed locally. If not, during installation, VHM prompts the user to enter the IP address and port for the DFM Broker. VHM then registers the VHM domain manager with the DFM broker.
SNMP Trap Receiving	To receive SNMP traps for VoIP devices from DFM, VHM must update the trap forwarding filter in DFM. When DFM receives a trap, it forwards the trap based on the definition of the trap forwarding filter. The VHM trap receiver receives the trap and analyzes it to generate an event in VHM.

Table 1-1 Interdependencies between VHM and DFM (continued)

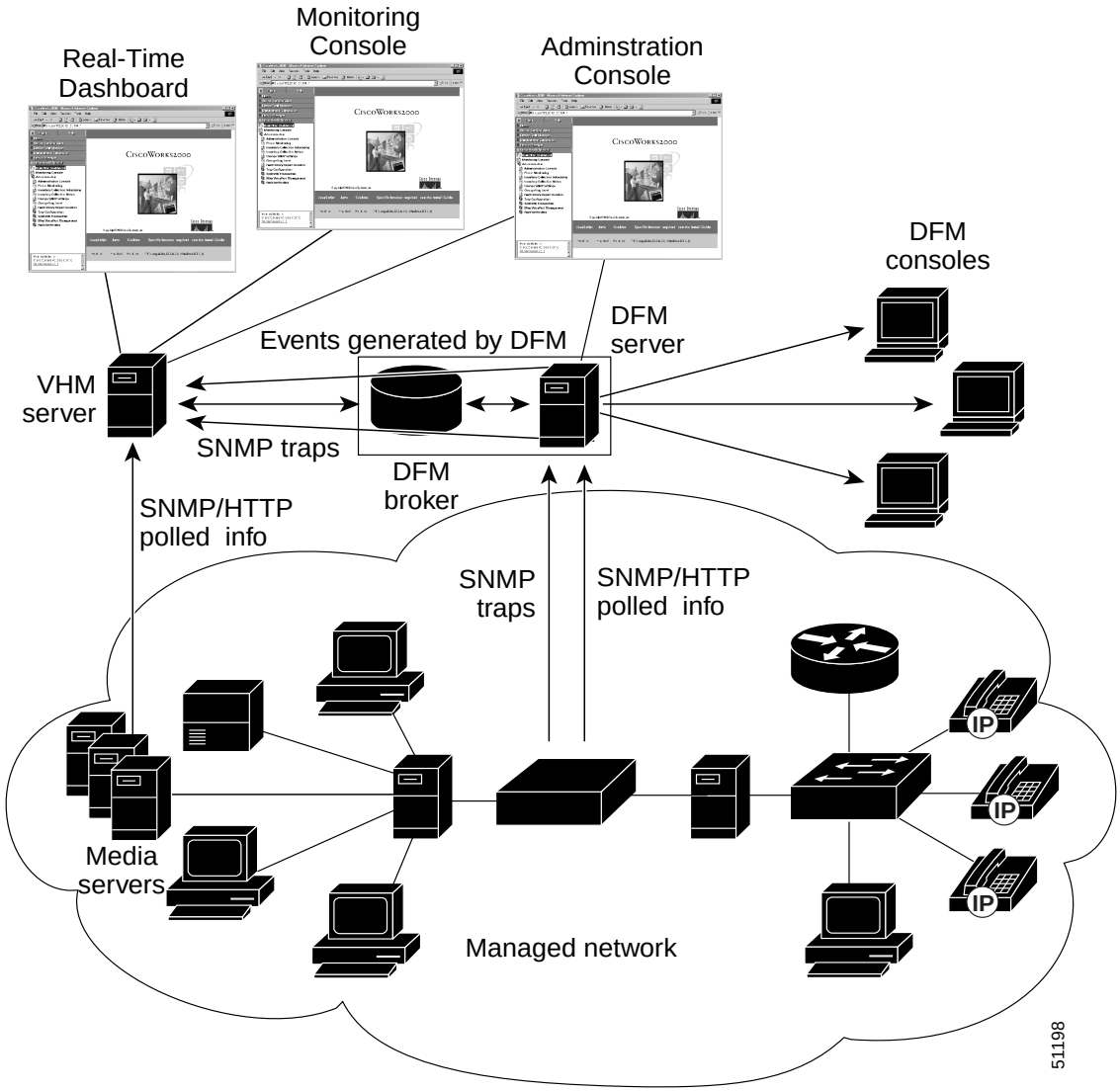
Component or Feature	Description of Dependency
Inventory Collection	Inventory Collection synchronizes the VHM device list with DFM; during this process, voice-enabled devices that have been added to or deleted from DFM inventory will also be added to or deleted from VHM inventory. When Inventory Collect All is triggered in VHM, it sends a rediscovery trigger to DFM. After DFM completes rediscovery, VHM proceeds with rediscovery, importing any newly installed voice cards, ports, or voice applications. If the link between the device and the DFM server is slow, DFM could time out or mark the interface type as Generic. If the rediscovery process times out and DFM does not discover an interface, VHM also will not discover the interface. VHM also registers with DFM to receive device list update events. If any device is added or deleted, or becomes unresponsive, DFM sends an event alarm to VHM. VHM can process the event by, for example, starting to manage new voice-enabled devices. **Note** If a device appears as Undiscovered in DFM, it also appears as Undiscovered in VHM. If a device appears in a valid category (for example Host, Switch, or Router) in DFM but does not have a voice interface, it will be unsupported in VHM. If a device is uncertified in DFM, it will not appear anywhere in VHM.
Alarm logs	VHM generates voice faults and listens for element-level faults from DFM. If VHM receives an alarm for a device it manages, it uses the alarm in voice fault correlations. Alarms for devices that VHM does not manage are dropped. For more information about VHM fault browsers, see Chapter 2, "Monitoring Voice Network Health."

Table 1-1 Interdependencies between VHM and DFM (continued)

Component or Feature	Description of Dependency
Device classification differences between VHM and DFM	VHM and DFM classify devices differently. For example, Cisco routers and Catalyst switches are managed by both VHM and DFM. However, DFM classifies Cisco routers as Router class, while VHM classifies routers as Voice Gateways. **Note** VHM only manages Cisco routers and Catalyst switches that have VoIP cards or ports. See the "Device Types that VHM Manages" section on page 1-9 for more information.
Polling and threshold parameters between VHM and DFM	Threshold parameters for voice-enabled routers and switches must be set in DFM. However, threshold parameters for media servers must be set in VHM and are not shared with DFM. Polling parameters are not shared between VHM and DFM. However, it is best to synchronize them to avoid inconsistent polling of devices. Therefore, it is recommended that you set polling intervals the same in both VHM and DFM.

Figure 1-1 illustrates the architecture that VHM shares with DFM.

Figure 1-1 VHM Architecture



How VHM Integrates with Third-Party NMSs

VHM can be integrated with third-party vendors' NMSs such as HP OpenView Network Node Manager. VHM integrates with an NMS in two ways:

- Although VHM receives traps only from DFM, DFM can receive traps from an NMS or directly from devices. As a result, the traps DFM forwards to VHM may have come from an NMS or from a device.

  See *Installing and Setting Up the Device Fault Manager on Solaris* for the default port numbers used by DFM and NMS and for example configuration scenarios to help you understand how DFM and NMSs can work together.

- VHM provides a trap notifier that allows you to:
  - Configure the port and IP address of the NMS that the trap notifier sends SNMP trap messages to.
  - Forward event notifications in the form of an SNMP trap to an NMS, when the NMS has been configured to listen on that port.

Device Types that VHM Manages

The voice-specific devices managed by VHM are categorized by voice device group. Table 1-2 lists the voice device groups and their descriptions.

Table 1-2 Voice Device Groups

Group	Description
VC (voice cluster)	All CallManagers in a voice cluster, and all the devices with voice cards that register with any CallManager in a cluster (including Voice Gateways and Digital Voice Gateways).
VoiceServices	Media servers that may be running workflow applications or Cisco voice applications.

Table 1-2 Voice Device Groups (continued)

Group	Description
Phone Access Switch	Catalyst switches with Ethernet ports that support IP phone connections and can supply power to IP phones. **Note** If a switch has both Ethernet and Voice Gateway modules, the switch will appear only under VoiceGateway in the Administration Console. In the Real-Time Dashboard, it will appear in both the VoiceGateway and the Phone Access Switch groups.
VoiceGateway	These include: • Catalyst switches with: – Voice T1/E1 – Transcoder – Conference bridge – Media termination points (MTPs) – Voice FXS • IOS routers with: – FXS – FXO – T1 PRI/E1 PRI

Table 1-2 Voice Device Groups (continued)

Group	Description
VoiceMailGateways	Digital PBX Adapter (DPA) devices that provide Octel Voice Mail integration to Cisco CallManager. In the Summary View, VoiceMailGateways are summarized in one row.
MonitoredPhone	Selected IP phones monitored. In the Summary View, all monitored phones are summarized in one row.

For each voice device group, the following information is displayed on VHM Real-Time Dashboard:

- Number of devices in the group
- Number of devices that have a Critical level fault
- Number of devices that have a Warning level fault
- Number of devices whose status is Indeterminate

For further information on the Real-Time Dashboard and the individual information displayed for each voice device group, see the "Using the Real-Time Dashboard" section on page 2-1.

VHM Support for Cisco CallManager

VHM supports Cisco CallManager Release 3.0(5) to 3.2. The functionality you receive from VHM depends on the release of Cisco CallManager you are using. Also, each release of Cisco CallManager displays certain information differently. See the "Cisco CallManager Caveats" section on page 1-12.

The following lists describe the functionality you receive with each release.

Cisco CallManager Release 3.0

- Monitoring of Cisco CallManager run status
- Monitoring of other voice services on run status

- Configuration of synthetic transaction on Cisco CallManager, and monitoring the transactions
- Monitoring of connectivity between Cisco CallManager and various voice gateways (for example, digital voice gateway DT24+ and DE30+ running skinny protocol, voice gateways having FXS and FXO)

Cisco CallManager Release 3.1

You receive all the functionality of Cisco CallManager 3.0(5) plus the following:

- Monitoring of Gatekeeper connectivity with a Cisco CallManager cluster
- Monitoring of IP phones
- The ability to identify the voice cluster for the Publisher Node Media Server
- Additional voice gateways:
  - Catalyst 6000 with T1 port and FXS card
  - VG 200 with FXS, FXO and T1 running MGCP
  - Digital Voice Gateways DT24+ and DE30
  - Catalyst 4224 Access Gateway Switch with FXS, FXO and T1
  - Catalyst 4000 Access Gateway Module with FXS, FXO and T1

Cisco CallManager Release 3.2

You receive all the functionality of Cisco CallManager 3.1, plus the following.

- Suspect phone detection
- Cluster level information for total and active IP phones

There are also differences in the support for the two hardware platforms Cisco CallManager uses. The voltage sensor trap is supported for the IBM system but not for the Compaq system, and processor utilization is supported in the Compaq system but not in the IBM system.

Cisco CallManager Caveats

- For Cisco CallManager 3.0, the Connectivity tab in the Real-Time Dashboard Device Detail View displays multiple rows for a voice gateway port registered to the CallManager. The rows are empty; the Active CallManager and the CallManager list do not populate the rows.

- For Cisco CallManager 3.1 and 3.2, the Connectivity tab in the Real-Time Dashboard Device Detail View displays one row for a voice gateway port registered to a Cisco CallManager Cluster. The Active CallManager and the CallManager list populate the rows.
- For Cisco CallManager 3.0, the Real-Time Dashboard Device Detail View displays a digital voice interface in the Interface tab. This displays the D-Channel status. For Cisco CallManagers Release 3.1 and 3.2, the D-Channel status is not displayed. For these releases, D-Channel is supported by the ccmGatewayLayer2Change trap.

Locating the Supported Device List

Information about devices installed with VHM can be found at:

http://www.cisco.com/univercd/cc/td/doc/product/rtrmgmt/cw2000/vhm/vhm1_1/index.htm

How VHM Works with the CiscoWorks2000 Server

VHM works in conjunction with the CiscoWorks2000 Server, which represents a common management foundation, providing a set of management services shared by multiple management applications. VHM uses these CiscoWorks2000 components:

- Desktop GUI
- Security
- Help Engine and Files
- Web Server/Servlet Engine
- User Accounts
- Widgets, Classes, and Libraries
- Java on SNMP Stack
- CMF Debugging Tools—LogMsg
- Process Management

Starting the VHM Application

To start VHM from the CiscoWorks2000 desktop:

Step 1 Click the **Voice Health Monitor** drawer from the CiscoWorks2000 desktop.

The following applications and folders are displayed:

- **Real-Time Dashboard**—Provides a summarized status of the voice network, grouping voice devices logically and allowing you to drill down into the details of each device and device group. See the "Using the Real-Time Dashboard" section on page 2-1.
- **Monitoring Console**—Allows you to view the alarm logs that VHM and DFM have generated against devices. See the "Using the Monitoring Console" section on page 2-17.
- **Administration**—Contains applications that are used to configure and administer VHM. See Chapter 5, "Basic VHM Configuration."

Getting Started with VHM

Table 1-3 contains the tasks necessary to use VHM to discover VoIP network devices and applications and to generate faults based on voice network events.

Table 1-3 Getting Started Tasks

To perform this task...	Log in as this CiscoWorks2000 security role...	Then see...
Import voice network devices into VHM	Network Admin or Network Operator	"Managing and Unmanaging Voice Devices in VHM" section on page 5-4
Adjust polling intervals and fault thresholds	Network Admin or Network Operator	"Configuring Polling and Thresholds" section on page 5-10
Configure VHM notifiers	Network Admin or Network Operator	"Configuring Fault Notification" section on page 5-36

Table 1-3 Getting Started Tasks (continued)

To perform this task...	Log in as this CiscoWorks2000 security role...	Then see...
Schedule inventory collection	Network Admin or Network Operator	"Scheduling Inventory Collection" section on page 5-27
Configure synthetic transactions against CallManager	Network Admin or Network Operator	"Synthetic Transaction Overview" section on page 6-1
Examine a Real-Time Dashboard Summary View of the voice network	Users in all five security roles may execute these tasks	"Using the Real-Time Dashboard" section on page 2-1
Use the Real-Time Dashboard Status View for a voice device group	Users in all five security roles may execute these tasks	"Using the Status View" section on page 2-9
Obtain device-specific information from the Real-Time Dashboard	Users in all five security roles may execute these tasks	"Using the Device Detail View" section on page 2-15
View and respond to alarms	Users in all five security roles may execute these tasks	"Using the Monitoring Console" section on page 2-17
Add and monitor specific IP Phones	Network Admin	"Setting Up Phone Monitoring" section on page 5-24
Managing Ethernet voice ports	Network Admin	"Managing Ethernet Voice Ports" section on page 5-8