


VoIP Network Performance: Getting Insights from the Cisco Unified Communications Manager



Read about how you can get critical insights on VoIP performance problems from the Cisco Unified Communications system.



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Unified Communications today

Many businesses worldwide have gone beyond just migrating traditional IP-PBX to VoIP. They now look to combine all forms of communication (Instant Messaging, Video, fax, web applications etc) over a unified IP network. A research paper by Cisco says that compared to legacy time-division multiplexing (TDM)-based networks, companies today are saving 20-40 % of annual voice operation costs by moving to a converged IP-based communication network.

While a lot of productivity and cost benefits accrue from the use of Unified Communications, there remains a section of people for whom this popular technology has not helped very much; the VoIP engineers and network administrators. What once used to be a case of loose wires, plug points, interference or PBX box problems is now literally a virtual puzzle taking three times as long to troubleshoot call connection or call quality problems over VoIP.

In this paper we discuss ways of getting critical insights on VoIP performance problems from the Cisco Unified Communications system.

The Cisco Unified Communications Manager

The Cisco Unified Communications Manager (formerly known as the Cisco Unified CallManager), CUCM, is the call-processing component of the Cisco Unified Communications system. It consists of a system of drivers, operating system, firmware and database all rolled into one application on top of the hardware, in what Cisco calls the appliance model. The CUCM forms the backbone for all of the mobility features such as Cisco Unified Personal Communicator, Cisco Unified IP Communicator, Cisco Unified Wireless IP phones, Cisco Unified Mobile Communicator and other third party phone clients.

With each CUCM cluster being able to support more than 30,000 users, the CUCM



easily becomes the central hub for all forms of communication in the corporate network. The core call processing unit of the CUCM builds upon all the capabilities present in the older versions of Cisco CallManagers (Cisco CallManager 4.x, 5.x).

VoIP Call Performance details from the CUCM

Some of the ways in which the CUCM provides information on VoIP performance details are:

1. *Through APIs such as Cisco TAPI, Wave Driver and the Cisco JTAPI*
Using these, custom applications can be made to monitor telephony devices and call events, establish call control and even terminate media, play announcements and record calls. These methods generate extra load on the CUCM as well as the IP network and is hence not recommended for large VoIP deployments.
2. *Serviceability XML*
These are tools and services designed to monitor, diagnose and address issues to the CUCM through performance counters, trace files and logs, Call Detail Record files and SNMP data.
3. *SNMP/MIBs*
The SNMP interface allows external applications to query and report various UCMgr entities. It provides information on the connectivity of the CUCM to other devices in the network, including syslog information. Apart from providing summarized information such as total number of connections, peak busy hours etc., this method does not expose individual call-specific data and hence not preferred for troubleshooting call problems.

CDRs and CMRs

Among the various options offered by the CUCM to collect call performance data, the most scalable, easy to configure and use are the Call Detail Records, provided also by the Serviceability XML. The CUCM generates two different types of call information records: Call Detail Records (CDRs) and Call Management Records (CMRs). The CDRs store information about the endpoints of the call and other call control/routing aspects. The CMRs contain information about the quality of the streamed audio of the call. More than one CMR can exist per CDR.



CDRs and CMRs, collectively known as CDR data, serve as the basic information source for the CUCM's CAR (Call Analysis and Reporting) and come in handy for network administrators while troubleshooting VoIP performance problems. Each CDR record comprises of call information such as the call initiator's and participant's name, IP address, media port, call initiated time, duration, reasons for call teardown, and many more stats related to a call. The CMR records contain the Quality of Service (QoS) experienced by the initiator and participant of a call, using various metrics such as jitter, latency(delay), packet loss, bandwidth consumed by the call etc.. By analyzing the data from CDR and CMR one can easily troubleshoot call quality degradation and failures.

The rest of this whitepaper focuses on the CUCM CDR & CMR advantages and disadvantages, configuring the CUCM for CDR export and the presentation of data from these records.

CDR data for VoIP performance monitoring - Pros & Cons

While troubleshooting call quality, the ability of the QoS monitoring and reporting solution to report QoS as accurately as possible makes the difference in being able to quickly detect and resolve faults. For this, the solution needs to report on the QoS as experienced by the endpoint. The CUCM is well-positioned for this as all the endpoints are connected to it, with the CUCM facilitating all the calls in the network. Thus the CDR data created and exposed by the CUCM are a reliable source of endpoint QoS information.

Other ways of monitoring QoS such as using a sniffer solution over a spanned port may not work as accurately, as latency and packet loss get into the picture while directing all call traffic to the spanned port. Apart from the information accuracy, complexity in set-up, non-scalability over large or distributed VoIP networks, the method's added traffic load (due to mirroring of traffic at the span port) make the sniffing method less popular among the VoIP engineers.

The configurations involved in setting up the CUCM to send CDR data are easy and minimal. With a monitoring solution that is also simple to set-up, one can start monitoring VoIP network performance within minutes using the CUCM CDRs. Even with a distributed VoIP network having multiple CUCM clusters, it requires less effort and expertise to set-up monitoring via CDRs as compared to setting up a sniffer solution.

What one does not get by monitoring CDR data?



1. Real-time, active calls cannot be viewed using the CDRs and CMRs. As these records are generated by the CUCM on call completion, CDR data only help in post event analysis.
2. Raw packet level debugging is not possible unlike the sniffing methods where every packet sent is processed and analyzed.

Setting up the CUCM to export CDR data

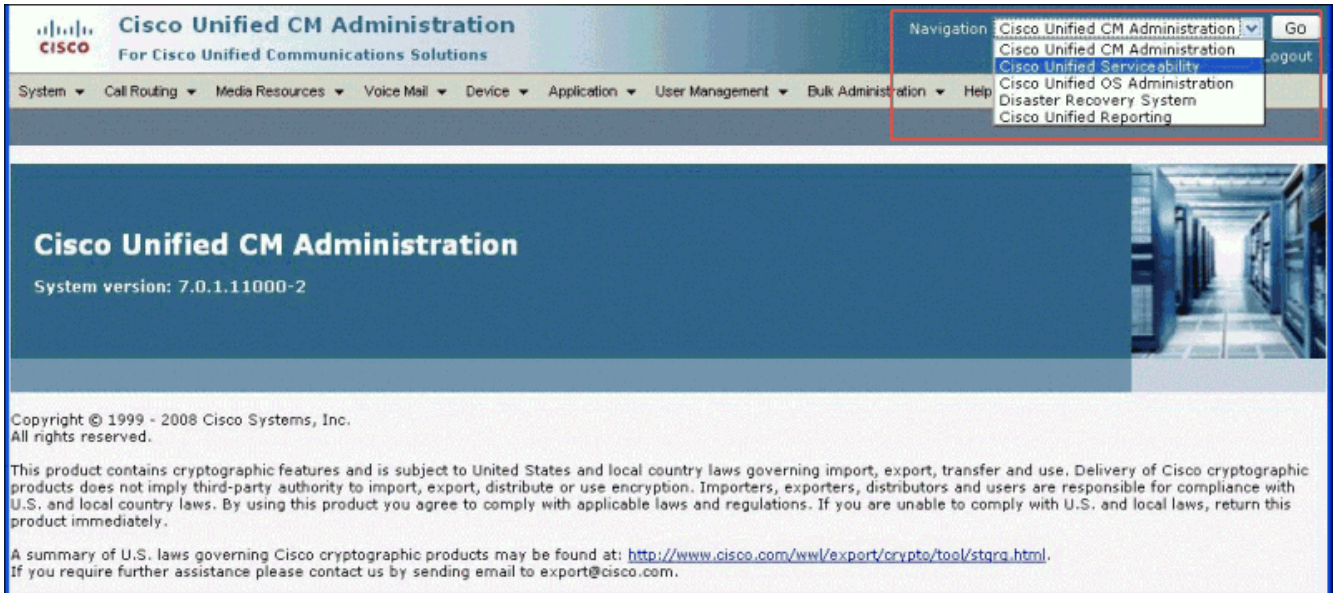
The CDR and CMR files from the CUCM can be sent to a VoIP monitoring solution installed in a remote server using File Transfer Protocol (FTP). The FTP-Push is Cisco's recommended solution for fetching CDR and CMR information. Collecting the CDR and CMR data from the CUCM via FTP Push does not put extra load on the CUCM unlike querying the CUCM for collecting CDR and CMR data, especially in the case of large VoIP deployments. Since the CUCM allocates highest priority for call processing and then for the FTP-Push process, one is guaranteed that call processing by the CUCM will not take a hit.

How to enable FTP-Push option in CUCM

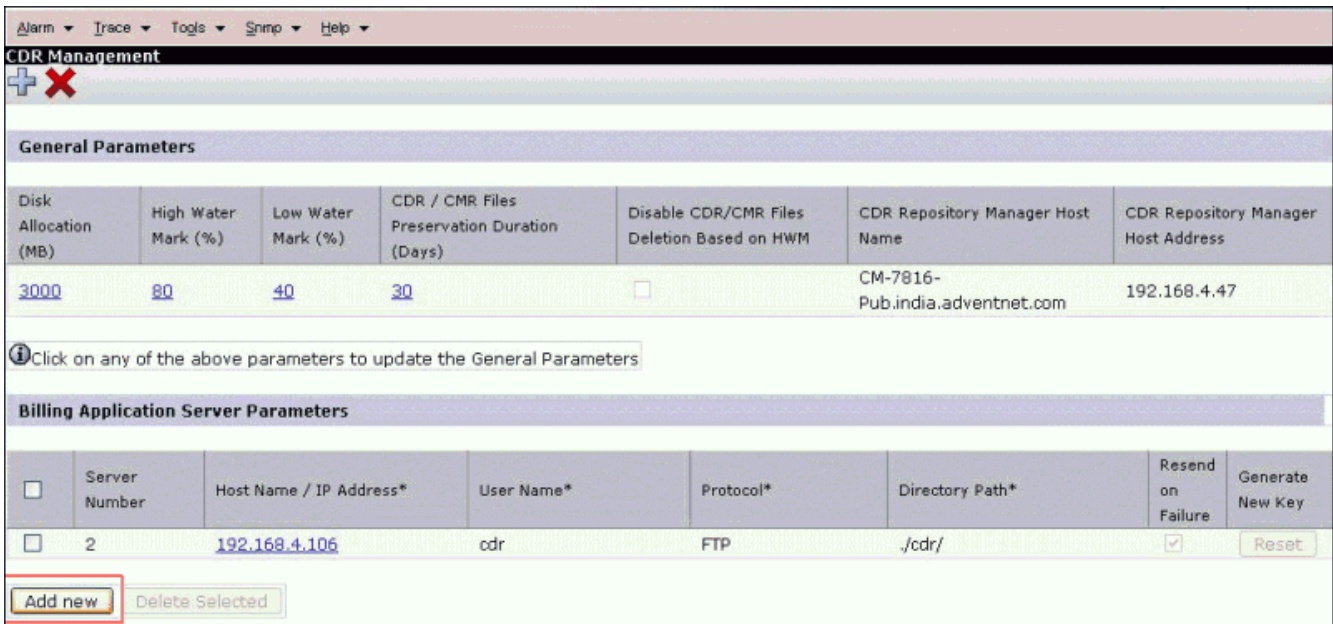
This Cisco document on [CDR Repository Manager Configuration](#) and the below steps help to configure a CUCM to push CDR log files through (S)FTP to a remote location. The steps include step by step screen captures from a CUCM 7.0 for enabling FTP push to a remote billing or monitoring application server:

1. Select the option as “**Cisco Unified Serviceability**” from the navigation drop down.



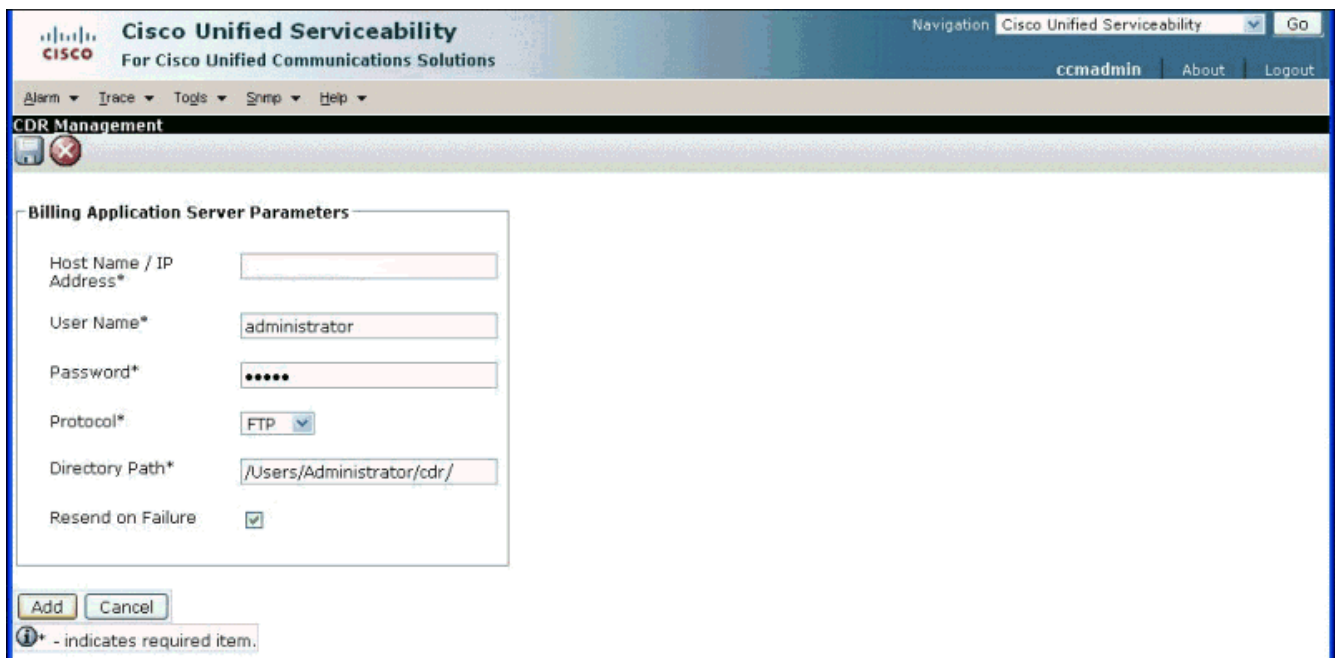


2. Click on 'Go'.
3. Click on **Tool** menu -> **CDR Management**
4. Click on 'Add new' button in the bottom.



5. In the server parameters form,

- Specify the **Host Name or IP Address** of the remote server.
- Specify the login credentials of the remote machine where you want to push the data in the **Username** and **Password** fields.
- Select the **Protocol** used in communication from the drop down as **FTP/(S)FTP**.
- Specify the **Directory Path** to push the CDR log file.
- Enable the check box to **'Resend on Failure'** (will be helpful in resending the CDR Log file in case of any failure).
- Click on **'Add'** button to save the settings



The screenshot displays the Cisco Unified Serviceability web interface. The page title is "Cisco Unified Serviceability For Cisco Unified Communications Solutions". The navigation bar includes "Navigation", "Cisco Unified Serviceability", and "Go". The user is logged in as "ccmadmin". The main content area is titled "CDR Management" and contains a form for "Billing Application Server Parameters". The form fields are:

Host Name / IP Address*	<input type="text"/>
User Name*	<input type="text" value="administrator"/>
Password*	<input type="password" value="*****"/>
Protocol*	<input type="text" value="FTP"/>
Directory Path*	<input type="text" value="/Users/Administrator/cdr/"/>
Resend on Failure	<input checked="" type="checkbox"/>

At the bottom of the form are "Add" and "Cancel" buttons. A legend indicates that an asterisk (*) indicates a required item.

ManageEngine VQManager for CDR and CMR analysis and reporting

The CUCM CDR and CMR expose two important sets of data other than call statistics: call quality and bandwidth consumed. ManageEngine VQManager is a VoIP monitoring solution that uses this data to report on complete call details to facilitate quick

ManageEngine VQManager: White Paper



troubleshooting. It is a completely web-based, VoIP call and QoS monitoring software solution that provides both sniffing as well as CDR import and analysis options for VoIP performance reporting.

After successfully configuring FTP push in the CUCM, the instructions in this link http://www.manageengine.com/products/vqmanager/help/Configuration_wizard.html#cdr-import help one to configure VQManager to parse FTP-Pushed CDR and CMR data.

Below are screen captures showing some of easily identifiable, actionable data present in the solution



VoIP Calls – numbers and voice quality trend over 24 hours, including % of successful, unanswered & error calls





Average Call Duration (ACD), Reasons for call teardown, % of good, tolerable and poor calls with a list of all calls made





IP Phone specific details - call statistics, in & out traffic, including quality and bandwidth utilized details





Call specific details - call quality, participant-specific QoS trends, bandwidth consumed and codec used

References

<http://www.cisco.com/en/US/products/sw/voicesw/ps556/>

<http://www.cisco.com/en/US/products/sw/voicesw/ps2156/index.html>

http://www.cisco.com/en/US/prod/collateral/voicesw/ps6788/vcallcon/ps6567/product_data_sheet0900aecd80410f2d.html

http://www.cisco.com/en/US/docs/voice_ip_comm/cucm/devguide/7_1_2/overview.html

http://www.cisco.com/en/US/docs/voice_ip_comm/cucm/service/4_0_1/ccmsrvs/sscar.html#wpxref12319

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About ManageEngine

ManageEngine is the leader in low-cost enterprise IT management software. The ManageEngine suite offers enterprise IT management solutions including Network Management, HelpDesk & ITIL, Bandwidth Monitoring, Application Management, Desktop Management, Security Management, Password Management, Active Directory reporting, and a Managed Services platform. ManageEngine products are easy to install, setup and use and offer extensive support, consultation, and training. More than 36,000 organizations from different verticals, industries, and sizes use ManageEngine to take care of their IT management needs cost effectively. ManageEngine is a division of Zoho Corporation. For more information, please visit www.manageengine.com

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