Genesys Quality Management 8.1

Planning Guide

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Genesys solutions feature leading software that manages customer interactions over phone, Web, and mobile devices. The Genesys software suite handles customer conversations across multiple channels and resources—self-service, assisted-service, and proactive outreach—fulfilling customer requests and optimizing customer care goals while efficiently using resources. Genesys software directs more than 100 million customer interactions every day for 4000 companies and government agencies in 80 countries. These companies and agencies leverage their entire organization, from the contact center to the back office, while dynamically engaging their customers. Go to www.genesyslab.com for more information.

Each product has its own documentation for online viewing at the Genesys Technical Support website or on the Documentation Library DVD, which is available from Genesys upon request. For more information, contact your sales representative.

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Document Version: 81gqm_planning_4-2013_8.1.511.00

Table of Contents

Chapter

1 Introduction

This chapter provides an overview of this document, identifies the primary audience, introduces document conventions, and lists related reference information.

This chapter contains the following sections:

Document Purpose

This document helps you plan your ZOOM Quality Management solution. It describes the inputs and parameters that Genesys requires in order to create an accurate solution for your needs, together with the technical data, integration and sizing information for the GQM product portfolio.

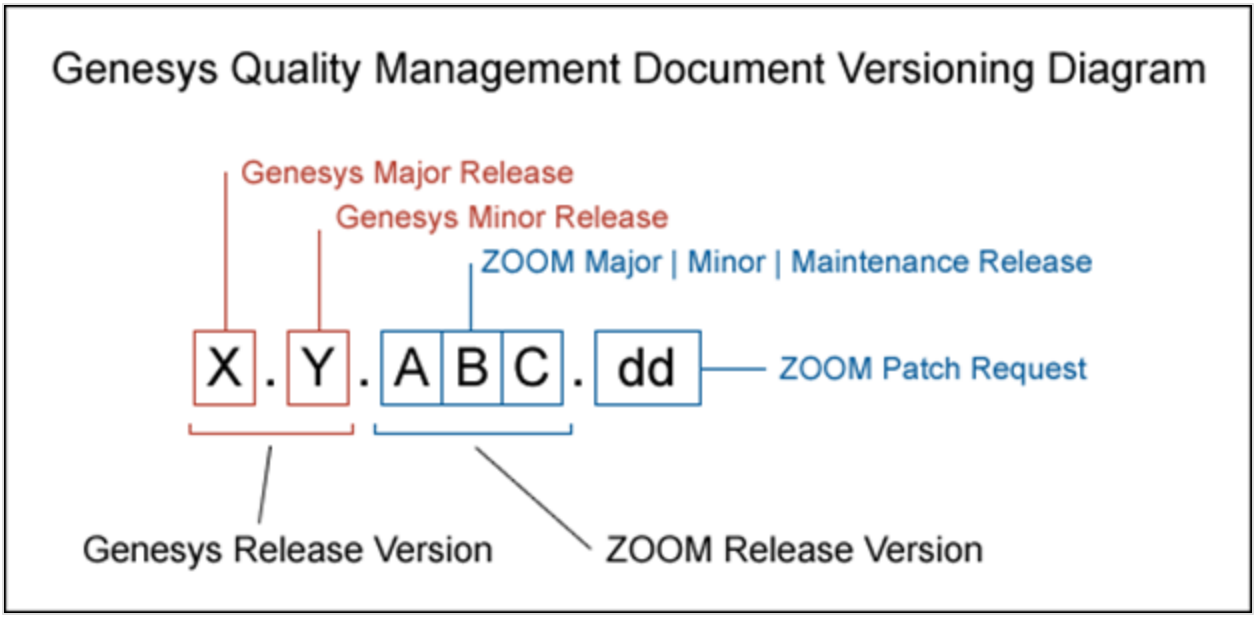
Audience

This document is intended for Systems Engineers and Administrators.

Document Version

The Genesys Quality Management products are provided by a partnership between Genesys and ZOOM International. The Genesys Quality Management products use a versioning format that represents a combination/joining of the versions used by these two separate entities. Although the Genesys Quality Management products and documentation use this combined versioning format, in much of the software and logs you will see the ZOOM versioning alone. You need to be aware of this, for example, when communicating with Technical Support.

The version for this document is based on the structure shown in the following diagram:



Typographical Conventions

Names of functions and buttons are in bold. For example: **Upload**.

File names, file paths, command parameters and scripts launched from the command line are in `non-proportional font`.

Referred documents are in italics. For example: see the document *This is a Document* for more information.

```
Code is placed on a gray background and bordered
```

Hyperlinks are shown in blue and underlined: http://genesyslab.com/support/contact.

Expected Knowledge

Readers of this document are expected to have the following skills or knowledge:

- Basic knowledge of Red Hat Enterprise Linux or CentOS.
- Unix-system administration skills.
- At least intermediate network knowledge – architecture, planning etc.

Chapter

2 Software Requirements

This section covers the software requirements for implementing Genesys Quality Management, both server-side and client-side.

Operating Systems

All GQM 8.1.500 modules are Linux-based and run on RedHat Enterprise Linux 6.2 32-bit operating systems only. 64-bit OS versions are not currently supported.

Linux was chosen for its high stability for demanding call recording, easy remote administration, superior uptime without restarts and no hidden additional costs. RedHat Enterprise Linux includes everything that GQM requires, for example, a database server, management tools and so on. RedHat Enterprise Linux supports a wide range of server hardware (Intel as well as AMD based servers).

RedHat Enterprise Linux as a commercial Linux distribution offers operating system support from Red Hat with pricing dependent on a Service Level Agreement.

Important:

Genesys suggest that all GQM modules run on the same operating system, for example, all on RedHat, 6.2 to ensure best possible stability and interoperability. Do not mix versions.

Linux File Systems

RHEL 6.2 uses the ext4 file system by default, which supports files and file systems of up to 16 TB in size (like the earlier ext3 system used for 5.x file system versions). However, ext4 supports an unlimited number of sub-directories, in comparison to 32,000 supported by ext3, and offers superior read/write performance to the ext3 system.

Browser Recommendations and Technical Requirements

A minimum screen resolution of 1024 x 768 is necessary to use the GQM applications comfortably.

The following supported browsers are recommended for the Web GUI. The Windows Media Player is needed for Call Recording. The Java plugin is required for Universal Player in Quality Manager.

The browsers for PCs are shown in order of preference. The fastest performing browsers are first:

1. *Google Chrome:* Please download the latest version. Check issues using the latest browser version before reporting them.The user must install the *Windows Media Player* plugin below:

http://www.google.com/support/chrome/bin/answer.py?hl=en&answer=95697

2. *Internet Explorer 9*
3. *Internet Explorer 8* with *Google Chrome Frame* plugin. The *Google Chrome Frame* plugin can be obtained here:

http://code.google.com/chrome/chromeframe/

4. *Internet Explorer 7* with *Google Chrome Frame* plugin.This version of IE should be upgraded to IE9 as soon as possible.
5. *Firefox 3.6.16+* Admin rights required for installation. The user must install the *Windows Media Player* plugin below:

http://www.interoperabilitybridges.com/windows-media-player-firefox-plugin-download

6. *Opera 9+*
7. *Safari 5*

8. *Internet Explorer 8* without the *Google Chrome Frame* plugin.The performance is slow.

The following browsers are not recommended:

Internet Explorer 7 without the *Google Chrome Frame* plugin runs too slowly.

Internet Explorer 6 is not supported.

Use Safari or Firefox with Mac OS 10.

Important:
Web browsers require a media player plug-in (*Windows Media Player* 9+ for Windows PCs, *VLC* for Macs and Linux) for audio and video media review, and at least *Adobe Flash Player* 9.x runtime installed for viewing reports.

Internet Explorer Security Settings:

Windows XP

The following recommendations are encouraged for the Web GUI running on Windows XP:

- Check that the Call Recording URL is included in the "Trusted sites". If not, include it there. If the user doesn't have administrator privileges, contact the system administrator or set security level of the zone that contains the server to Low.
- Check that there is no proxy enabled in the web browser. If there is, try to disable it. The proxy can affect the functionality.
- Set the security level of trusted sites to Low.

Windows 7

The following recommendations are encouraged for the Web GUI running on Windows 7:

- Check that the Call Recording URL is included in "Trusted sites". If not, include it there. If the user doesn't have administrator privileges, contact the system administrator or set security level of the zone that contains the server to Low.
- Check that there is no proxy enabled in the web browser. If there is, try to

disable it.

- Set the security level of trusted sites to Low.
- Disable protected mode for all zones. If protected mode is Enabled for the internet zone, it affects the functionality, even if the server is in trusted sites, this is for Internet Explorer only.

Technical Requirements for Playing Audio and Video Media

The following media players are recommended for successful video and audio playback.

The media players are listed in order of preference, for the reasons supplied below:

1. *Microsoft Windows Media Player*: Plays all audio and video media on the Windows 7 OS. Previous versions of Windows, for example,Vista and XP, need additional codecs to play video media.
   Download the K-Lite Codec Pack (BASIC or BASIC Mirror versions) from: http://www.free-codecs.com/K_Lite_Codec_Pack_download.htm.
2. *VLC*: Plays combined video and audio recordings, including dual-screen recordings of 1920x1080 or larger. It is not integrated into browsers, for example, *Internet Explorer* and *Firefox*, for audio playback. *VLC* is recommended for Macs and Linux-based systems for combined audio and video reviewing. *VLC* can be downloaded at: http://www.videolan.org/vlc/.
3. *QuickTime*: Plays audio and is integrated into *Internet Explorer*, but does not support playing mp3 audio and H.264 format video together for combined audio and video playback.

Chapter

3 Supported Call Scenarios for Recording

The tables below show the call scenarios that are supported and therefore can be recorded by Call Recording.

This chapter contains the following sections:

Genesys Call Scenarios Supported

Call Scenario	Passive SIP	Genesys Driver EPR	Genesys Driver Active MSR
Agent to Agent (Basic call with logged agents on both sides).	✓	✓	✓
Basic call (Internal without logged agent).	✓	✓	✓
Call Hold	✓	✓	✓
Blind Transfer	✓	✓	✓
Consultative Transfer	✓	✓	✓
Blind Conference	✓	✓	✓
Consultative Conference	✓	✓	✓
Barge	✗	✓	✓
Call Supervision - Monitoring	✗	✓	✓
Call Supervision - Coaching	✗	✓	✓

Table 1: Genesys Call Scenarios Supported

Call Scenarios Supported to obtain Additional Data from GIM Integration

The table below shows for which scenarios and signaling GIM can supply additional data.

Call Scenario	Genesys SIP	JTAPI	Avaya
Agent to Agent (Basic call with logged agents on both sides) Data for calling agent only.	✓	✓	✓
Basic call (Internal without logged agent).	✓	✓	✓
Call Hold	✓	✓	✓
Blind Transfer	✓	✓	✗
Consultative Transfer	✓	✓	✗
Blind Conference	✗	✗	✗
Consultative Conference	✗	✗	✗
Call Park	✗	✗	✗
Call Pickup	✗	✗	✗
Barge	✗	✗	✗
cBarge	✗	✗	✗

Table 2: GIM Integration

Chapter

4 The Architecture of the Recording Solution

Call Recording has a multi-level module architecture that supports scaling for optimizing functionality in any environment.

This chapter contains the following sections:

Detailed Architecture

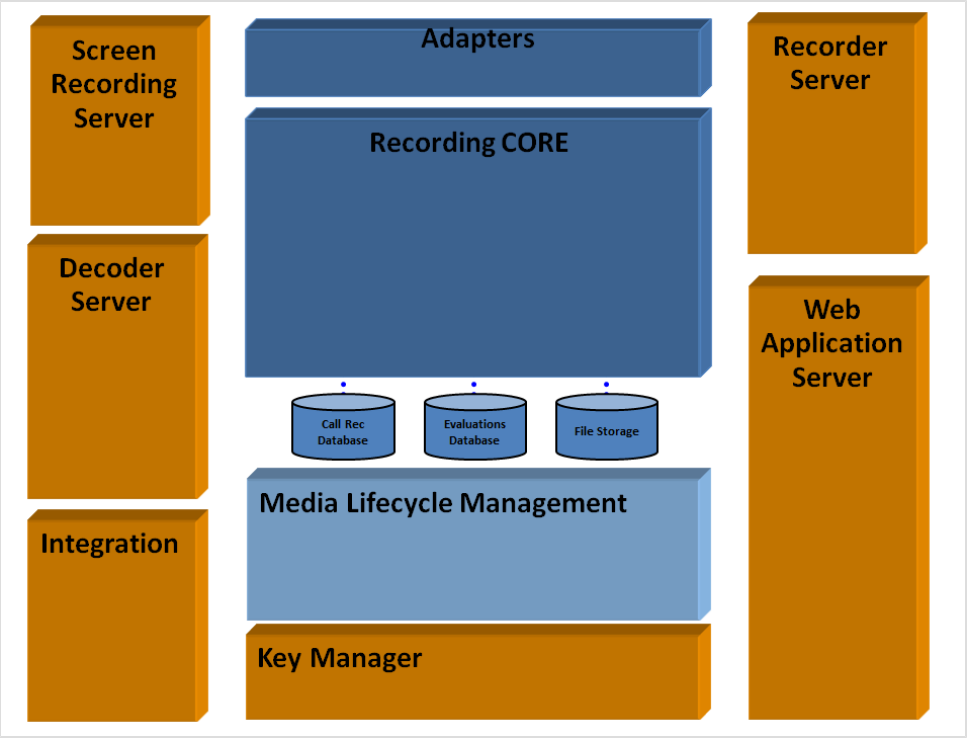


Figure 1: Call Recording Architecture

The figure shows a Block diagram of Call Recordings Architecture. Each module is explained in further detail in the following sections.

Modules within Call Recording

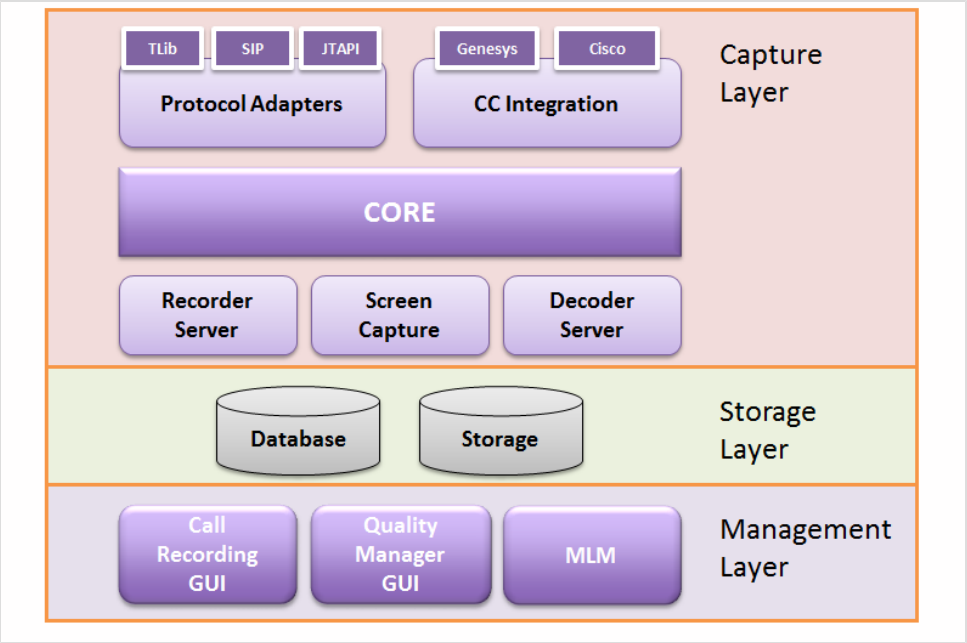


Figure 2: Call Recording Component overview

There are basically three layers in Call Recording.

- The Capture layer where Call Recording captures the signaling and RTP streams.
- The Storage Layer where the resultant files are stored.
- The Management Layer has the User interfaces and the Media Lifecycle Management.

The modules within the layers are:

- RMI / Naming Service / AMQP
- Core
- Protocol Adapters
- Recorder Server
- Active Recorder Server
- Decoder Server
- Database
- Web Application Server

RMI / Naming Service

The Java Remote Method Invocation (RMI) provides for remote communication between programs written in the Java programming language.

The Naming Service registers or de-registers services.

The Advanced Message Queuing Protocol (AMQP) provides a robust, secure message queue protocol, currently used by the Decoder Server for decoding jobs.

Core

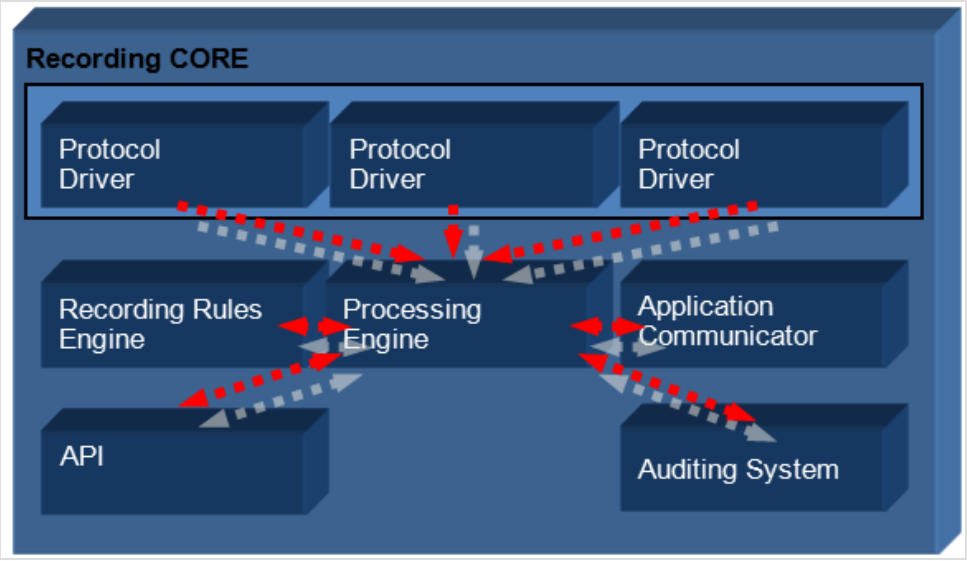


Figure 3: Call Recording Core

Call Recording Core controls the Recording solution.

Core is a finite-state machine that receives information about signaling from different Protocol Adapters through its Protocol Drivers. Core manages Recorder servers and Decoder servers; and communicates with the Database, Temporary and Permanent File Systems.

Core provides powerful APIs for third party applications, Auditing System and SNMP for monitoring.

Protocol Adapters

Protocol Adapters provide Core with the necessary signaling to determine the next actions (start recording, stop recording and so on).

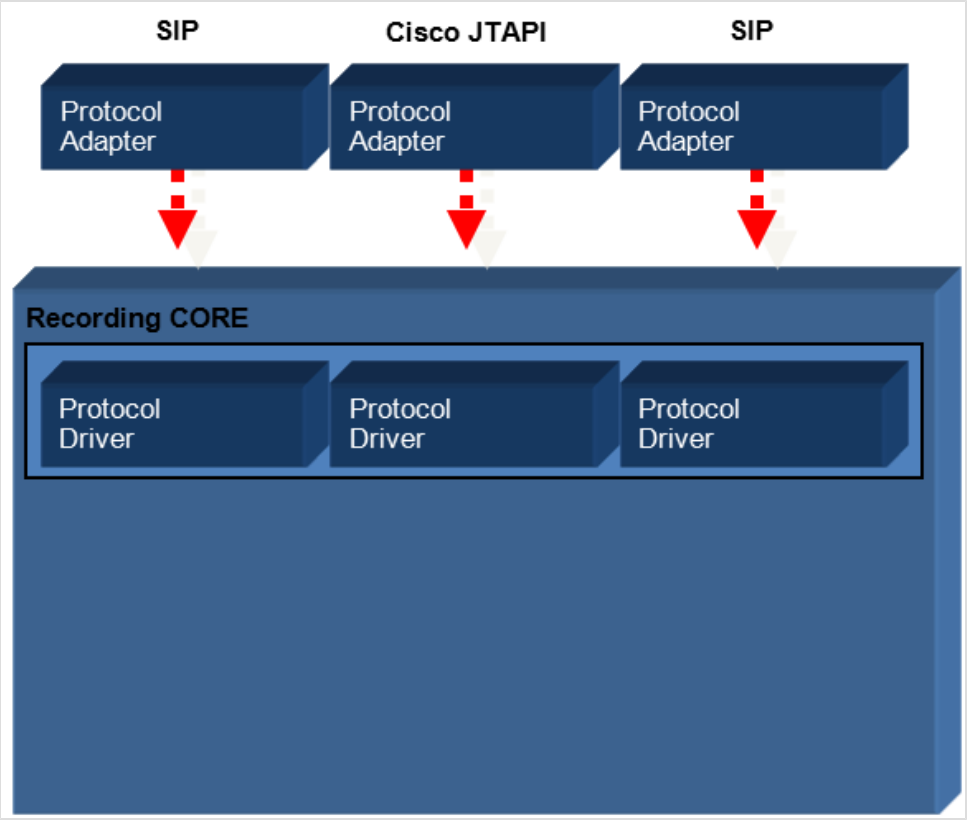


Figure 4: Protocol Adapters

Adapters and drivers convert native signaling to unified messages to enable Core to process message flows independent of the signaling protocols that they originate from. Where a new protocol is introduced to IP Telephony, Core uses a new driver.

Using driver and adapters Call Recording supports the following signaling protocols:

- Genesys Platform SDK TLib
- JTAPI
- Cisco SCCP

- Avaya JTAPI and DMCC
- Generic SIP

The role of each Driver or Protocol Adapter is to translate any signaling into standard messages for Core; informing Core about Call Establishment, RTP Streams start and end, transfers, conferences, on-holds, barge calls and so on.

Unified messages allow, for example, the use of Call Recording to record one group of phones by SIP adapter and a second group of phones by Cisco JTAPIwithin a single system.

When ZOOM releases support of new protocols, no changes have to be made to the Core which allows faster development and more stability.

Passive Recorder Server

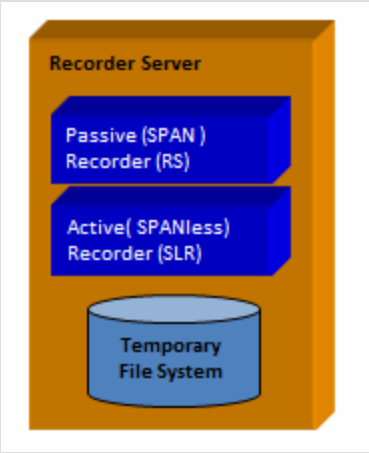


Figure 5: Recorder Server

The Recorder server is fully controlled by Core and starts or stops saving packets of particular specification (port, IP address) to temporary storage.

For SPAN based recording, the Recorder server is always bound to a particular interface (like eth1 on the Linux system) which is automatically turned to promiscuous mode to receive the RTP streams. The interface has to be connected to switch with SPAN port configured.

There can be multiple instances of Recorder server at an unlimited number of locations to support distributed IP telephony recording.

The Recorder server can also, if requested by Core, forward streams of RTP to a particular IP address and port which is used in live monitoring console for real-time listening to calls.

Active Recorder Server

The Recorder server is fully controlled by Core and starts and stops saving packets of particular specification (port, IP address) to temporary storage.

The Recorder server is always bound to a particular interface (like eth0 on the Linux system).

There can be multiple instances of Recorder server at an unlimited number of locations to support distributed IP telephony recording.

The Recorder server can also, if requested by Core, forward streams of RTP to a particular IP address and port which is used in live monitoring console for real-time listening to calls.

The telephone platform sends streams to the Recorder via, a built in bridge in the IP phone, or a conference, depending on the platform.

Single NIC deployment is possible, but a dedicated management interface is recommended.

Temporary Storage

Unprocessed raw data captured by the Recorder Server from the network are stored in the Temporary File System. For every recorded call the Recorder Server stores two files in .pcap format. Pcap files are processed right after call ends or are cached for later processing (if Pre-recording is enabled).

After processing of the recorded call, temporary data is deleted.

In the event of decoder failure, temporary data can be processed by the repair utility.

Decoder Server

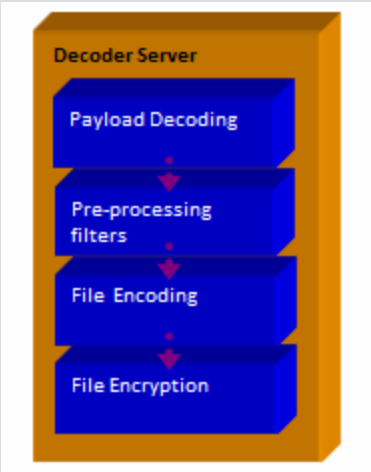


Figure 6: Decoder Server

The decoder server is used for:

- Sorting the saved RTP packets.
- Decoding the RTP Packets from G.711 / G.722 / G.729.
- Transcoding the streams to uncompressed PCM.
- Creating stereo out of two independent channels, calling and called party.
- Encoding the audio into WAV or MP3 format of selected quality.
- Optional encryption of recorded file, MP3 only, WAV encryption is not supported.

Database

By default Call Recording uses a standard SQL database (PostgreSQL) to which it connects by JDBC driver. The recordings database stores users, groups, recording rules and information about recorded calls. The actual media files themselves are stored in the File Storage system.

Figure 7: Database

The type of database that you choose depends on how large your recording needs are and how much evaluation and retrieval of media you need to do. For small to medium recording solutions the default PostgreSQL database is perfectly adequate and is the most cost effective way of storing calls screen captures and related data. For larger solutions, with over 50 million call records, Quality Manager and many IOPS (Input/output Operations Per Second) an Oracle database should be considered. The PostgreSQL database is limited to around 200 million call records.

Web Application Server

Figure 8: Image Caption

Call Recording has a web-based GUI which is used for:

- System configuration (users and groups management, recording rules setup).
- Call search & replay, Call Live Monitoring, Media Lifecycle Management and so on.

The Web GUI runs on Apache Tomcat java based application server.

The Web GUI communicates with Core (for example, to reload recording) and with Database and Permanent File System.

Core includes an Auditing System that creates a log of the events that occurred in Call Recording.

The log records:

- Call starts.
- Couple starts.
- RTP start and end.
- Requests to start and end recording to the Recorder server.
- Requests to the Decoder server for decoding.
- Database insertions.
- User log in, call replay, export, deletion.

The log supports installation debugging as well auditing user interaction with the system.

Application Communicator

The Application Communicator is the main source of runtime information about the whole recording system.

Monitoring tools such as SNMP communicates with Application Communicator and periodically or upon request show the status of all components attached.

If any component fails or reports warnings or problems the system can report this by SNMP for further action.

API

The Call Recording APIs enable the following:

- Connecting custom applications to the call recording software.
- Monitoring of activities and system core objects.
- Changing Settings.
- Adding custom information to calls.
- Pausing and resuming both call and screen recording.
- Deeply Integrating with third party Java applications.

Core operation monitoring is implemented by connecting an observer to specific parts of the Call Recording API that subsequently reports core changes through these observers.

Media Lifecycle Management Tools

Regulations mandate the recording of calls in many industries. In some industries these recordings must be retained for years.This is a large amount of data. Contact centers record thousands of calls a day. To avoid running out of disk space on the Recording server you must manage the data by Archiving, Deleting or Relocating the data.

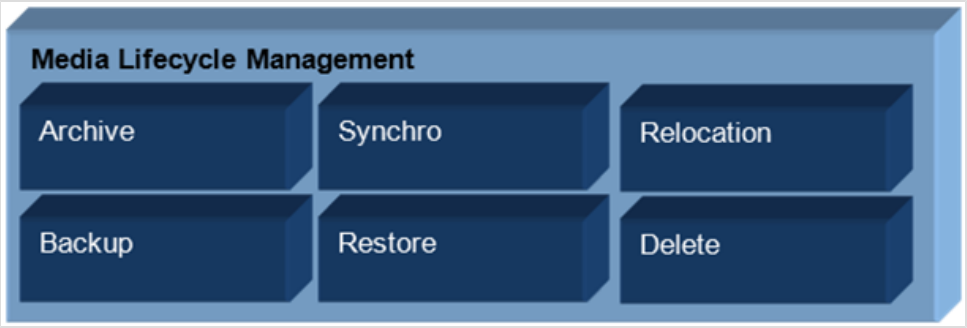


Figure 9: Media Lifecycle Management

Based on rules, calls can be automatically archived and transferred to permanent storage.

If a user requests a call that is no longer available on the direct access storage device, the system administrator is instructed to insert appropriate storage medium. When the call is retrieved and temporarily saved, the user is informed by e-mail.

Regular backups of system configuration and settings can be scheduled according to the customer's backup policy.

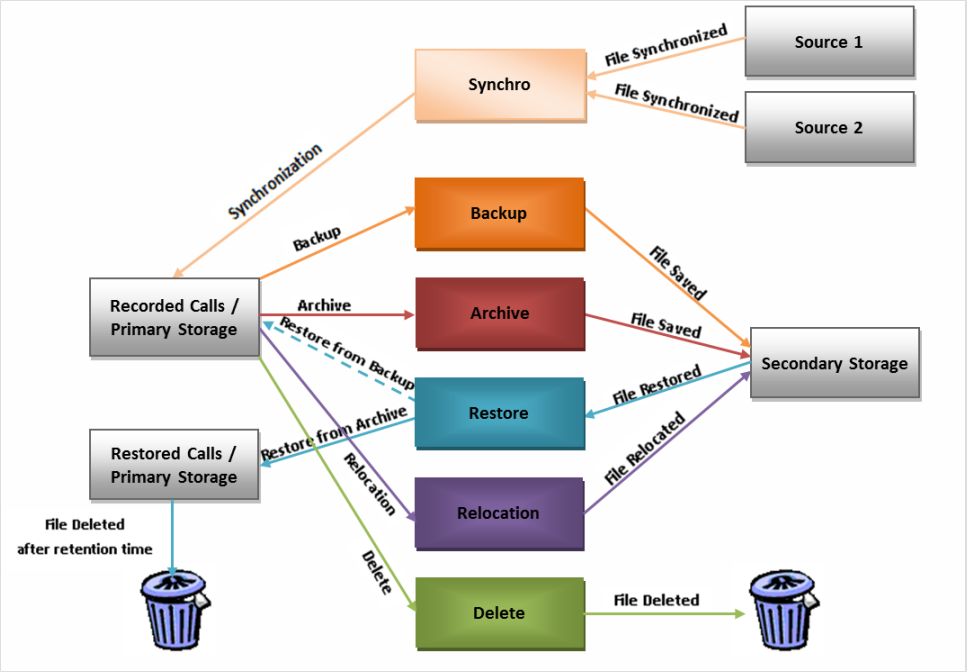


Figure 10: Media Lifecycle Tools

The diagram above shows the different Media lifecycles. The difference between Archive and Backup is that Archive marks the file as having been archived and will therefore only archive it once.

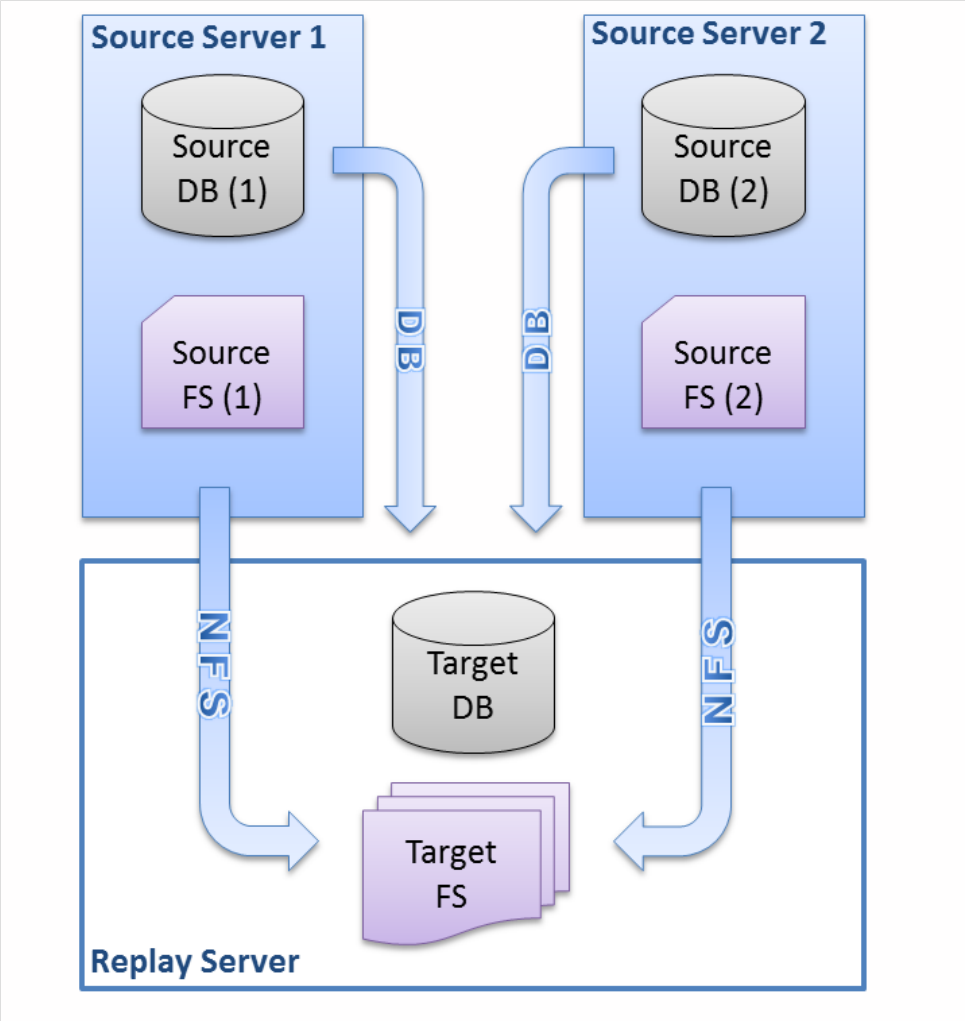


Figure 11: Synchro

Calls from multiple locations can be synchronized online to a central “Replay Server” for central access and archiving.

The Replay server consolidates recorded calls and user access. The Replay Server can also provide centralized Live Monitor application

Call replication to the Replay Server can be scheduled at selected times – during off-peak hours for example.

You can check synchronization between the system core server and replay servers using Web Reports

Chapter

5 Call Center Architectures

The recording method used to record calls depends on the network infrastructure and Operational Structure of your contact center or office.

This chapter contains the following sections:

Network Infrastructure

The network infrastructure includes:

- The type of IP PBX
- The signaling protocols available.
- The type of Gateways that are available.
- The type of Firewalls that are present if any. For example, SBC or SAN.
- Whether Genesys CIM is present.

The Operational Structure includes

- The number of Geographical Sites to be recorded.
- The Connectivity and Bandwidth between locations.
- How the Teams or Campaigns and Functional Groups to be recorded are organized.

Feature Support

The GQM technology support level for platforms from Genesys, Cisco and Avaya is defined as follows:

- **Full Support** – bug fixes, critical enhancement back ports from newer versions. **Note:** New features are never back ported.
- **Limited Support** – critical and blocker fixes only, migration from latest release to the latest version.
- **Not Supported** – no bug fixes, paid upgrade to latest version first.

Genesys Active Call Recording Architecture

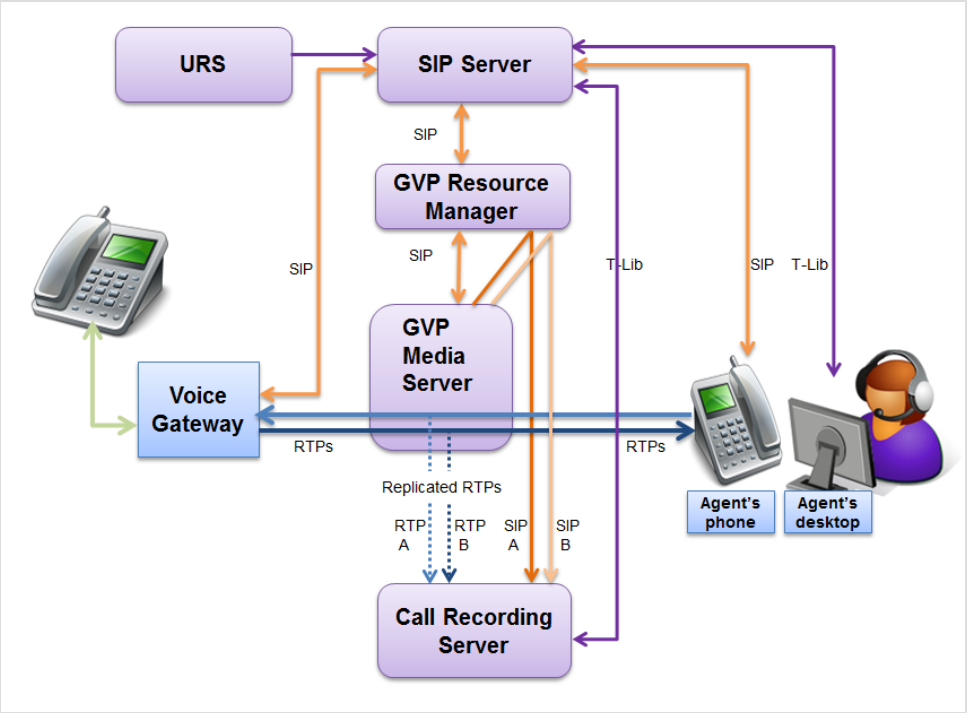


Figure 12: GARE Call Recording Architecture

Genesys Active Recording is provided by the Genesys Active Recording Ecosystem (GARE), which includes Genesys SIP Server, Media Server and Genesys Quality Management products.

For more information about GARE technology and configuration, see the *Genesys Active Recording Ecosystem*.

Supported Versions of the Genesys CIM Platform

GQM provides the following support for Genesys CIM.

Full Support: 7.6, 8.0, 8.1

Limited Support: 7.5

Not Supported: Below 7.5

Alternative Genesys Recording Methods

Although Active Recording is the preferred recording method when integrating with Genesys, other techniques can be used successfully, too.

Genesys Enhanced Passive Recording works by capturing SIP signaling protocol and RTP streams, and integrating the Genesys T-Server and Configuration Manager to get additional data about the calls.

Call Recording also provides direct support of Cisco Unified Communications Manager (CUCM) as a third-party PBX on the Genesys Customer Interaction Management Platform (CIM).

Finally, Genesys also supports recording via Stream Manager to create WAV files that can then be obtained by a third-party; however, Call Recording does not support this method, because it severely limits product functionality such as live monitoring, and provides no guarantee that the call will be recorded.

Active Recording of CUCM Integrated with Genesys CIM

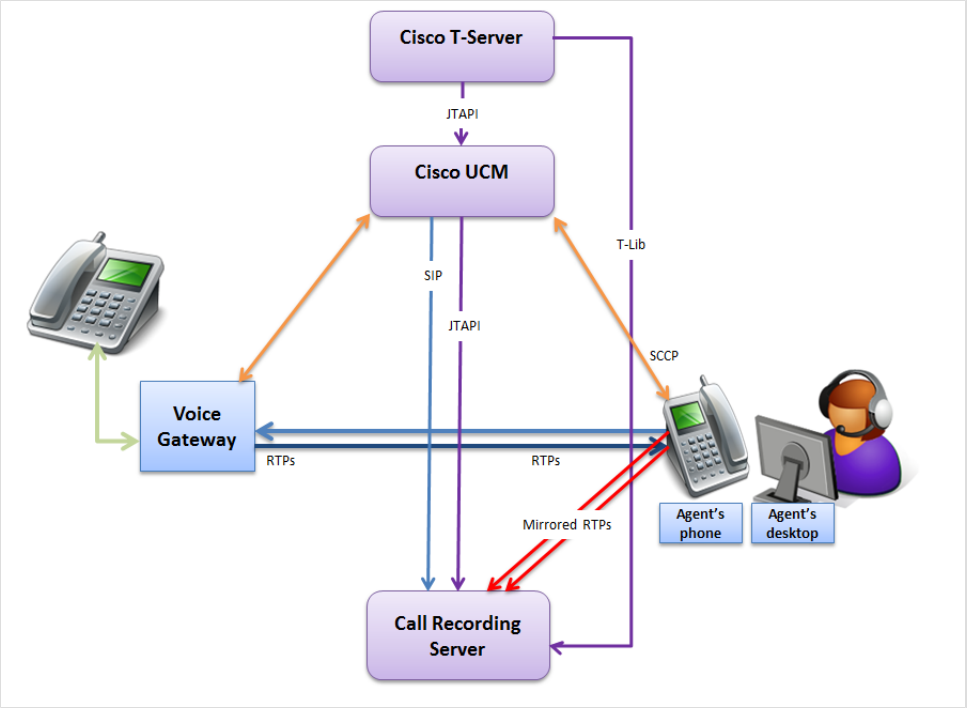


Figure 13: Active Recording of CUCM integrated with Genesys CIM

In the Active (device based) recording method Genesys CIM calls with CUCM, the Genesys (CIM) is deployed with CUCM as an underlying PBX. In this

scenario, the Cisco T-Server also performs integration. In addition to connecting to CUCM, Call Recording directly communicates with the Cisco T-Server to get the call related data not available from the Cisco platform.

Enhanced Passive Recording EPR with Genesys CIM

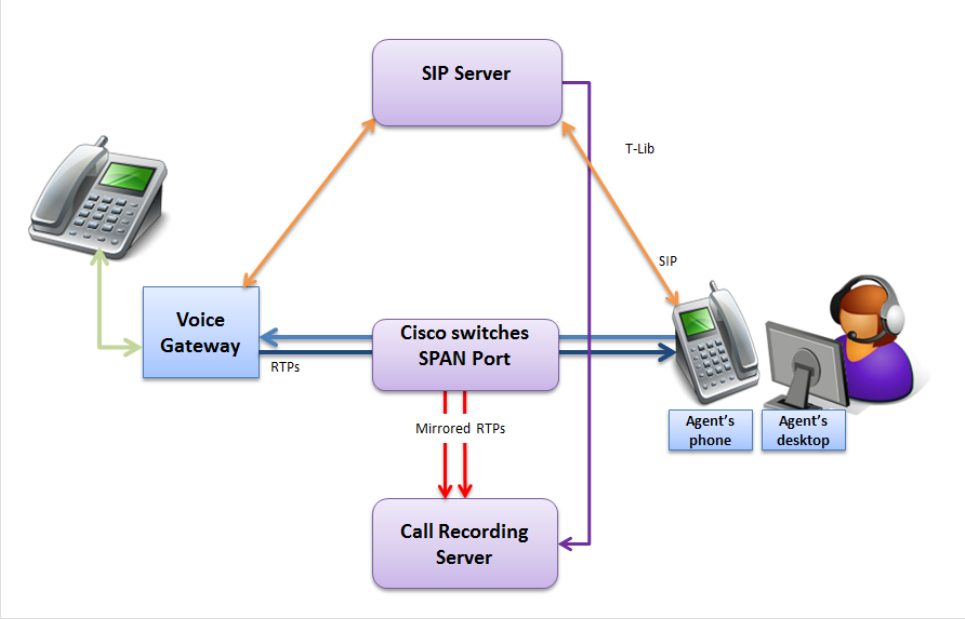


Figure 14: EPR with Genesys CIM

The EPR method on Genesys SIP Server tracks the SIP signaling protocol. The Call Recording server monitors the SIP signaling and extracts information about calls currently in progress. This includes the terminal addresses of the parties involved in the call, and as a result, the recording server captures the RTP streams. Through the T-Library, Call Recording integrates with the SIP T-Server to retrieve data about agents, their interactions, and any attached data.

This method is highly dependent on the network infrastructure.

Avaya Integration

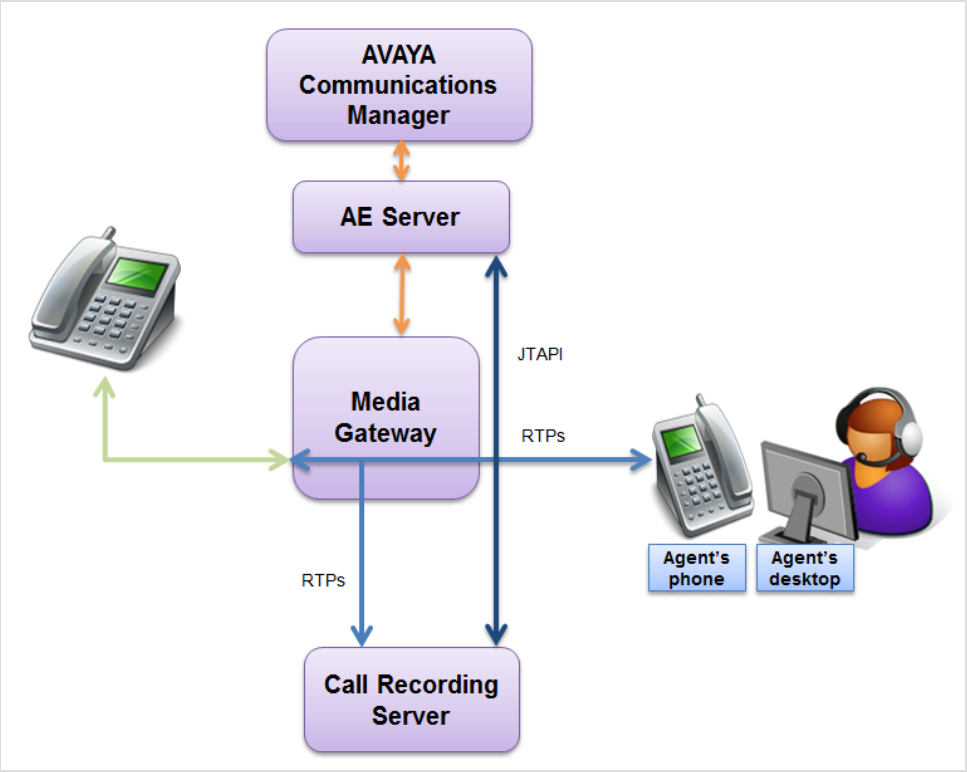


Figure 15: Avaya Architecture

Call Recording monitors phone activity. The AE server informs of any calls in progress and requests that the recorder's virtual device is added to a single step conference allowing the recorder to receive the RTP stream.

Supported versions of the Avaya Platform

GQM provides the following support for Avaya Aura (CM, AES).

Full Support: 5.2, 6.0, 6.1, 6.2

Limited Support: N/A

Not Supported: Below 5.2

Avaya Integration with Genesys CIM

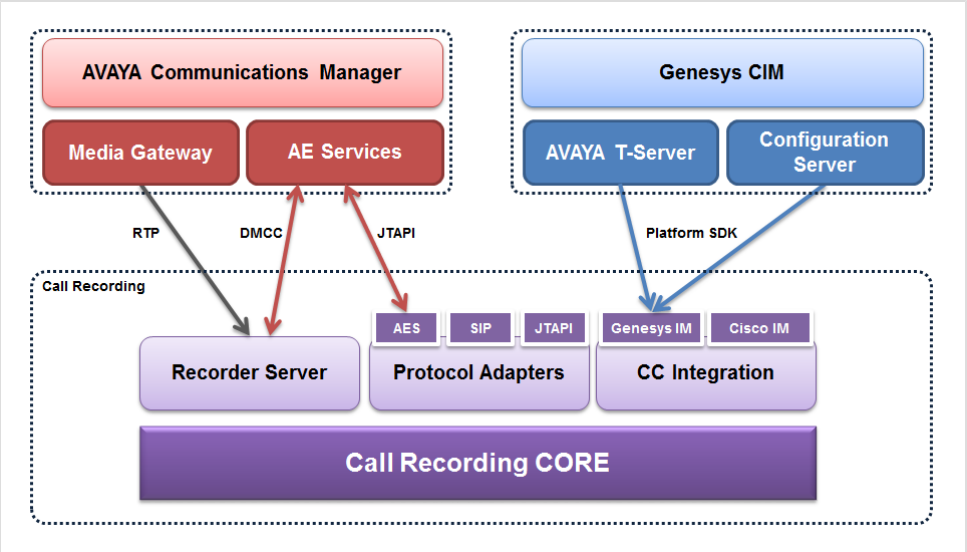


Figure 16: Integration with Genesys CIM

The Genesys Integration Module (GIM) is a basic Genesys CIM integration module that provides information about agents and other attached data from CIM T-Server to Call Recording. This attached data can then be used in searches for call recording.

Cisco Call Recording Architecture

This section describes the various methods of recording Cisco.

The oldest method is Passive SPAN based recording.This is still an option for the following cases:

- Recording during SRST mode (SCCP or SIP sniffer).
- Recording on a SIP trunk without active CTI control.

The Passive recording method relies on capturing the Skinny SCCP signaling but is not capable of detecting more complicated call scenarios, for example, conferences.

Passive Recording with JTAPI signaling is an improved version of the passive recording. Using JTAPIsignaling ensures that all the scenarios listed in Supported Call Scenarios for Recording are captured. It is useful for installations that cannot be recorded actively, for example, installations that have phones that do not support silent monitoring, that is, phones that do not have a built in bridge.

Active recording with JTAPI offers the most available functionality and reliability on a Cisco platform, and is recommended where possible.

Supported Versions of CUCM Skinny (SCCP) and JTAPI

GQM provides the following support for CUCM Skinny (SCCP) and JTAPI.

Full Support: CUCM 7.1, CUCM 8.0, CUCM 8.5, CUCM 8.6.

Limited Support: 2.3 (CUCM 4.3), 3.1 (CUCM 5.1), CUCM 6.0, CUCM6.1, CUCM 7.0.

Not Supported: 2.0 (CUCM 4.0), 2.1 (CUCM 4.1), 2.2 (CUCM4.2), 3.0 (CUCM 5.0).

Passive SPAN Based Recording

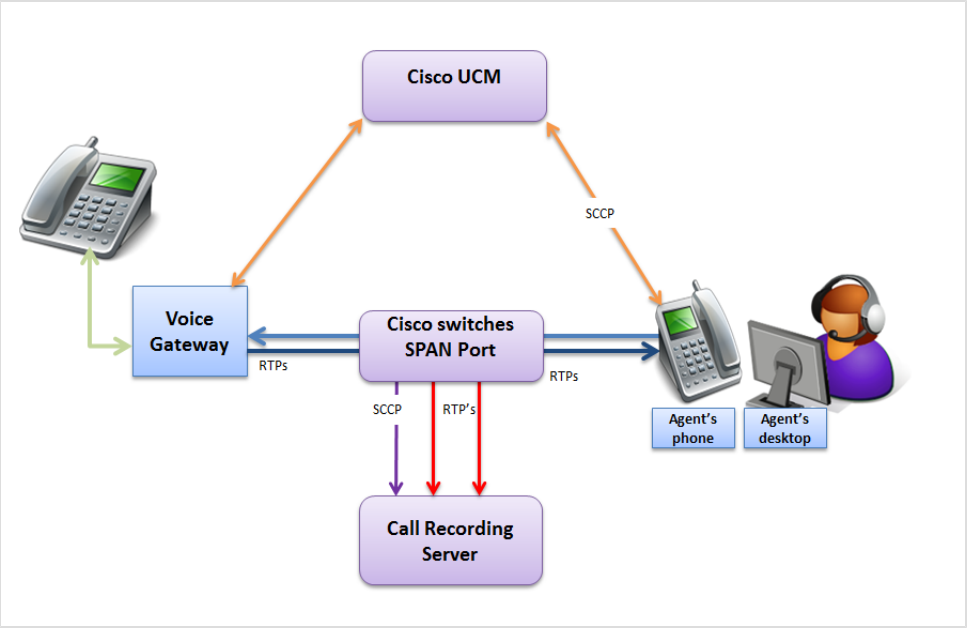


Figure 17: Passive Recording

Passive recording is the old approach to call recording in an IP PBX that does not require direct support from the IP PBX. It is suitable for older installations running CUCM 6 and below.

Passive recording of voice calls basically means capturing and interpreting a telephony signaling protocol, interpreting call events and based on them capturing the voice traffic as it flows between the IP endpoints. No direct interaction with a PBX or endpoints is necessary and thus no special support on the PBX side is required.

Passive recording works by connecting to the SPAN (Switched Port ANalyzer) port which allows Call Recording to monitor all network traffic and pick out only the VoIP traffic to record. Call Recording will "sniff" for signaling, and RTP (Real Time Protocol) packets via the SPAN port. These packets are taken directly from the network flow based on the call's header (sender, recipient and type of traffic). Call Recording detects header information using a promiscuous network adapter on the recording server from a SPAN port on a network switch.

Since IPT communication happens in real-time, capturing the packets must be real-time as well. The captured packets are stored temporarily and processed after the call ends. The main challenge is the independence of UDP packets used

for transmission of data, every packet can utilize a different path from sender to recipient, so they may arrive out of sequence. So in very wide networks, the passive recording system must monitor every possible route of the packets.

There are two main ways to capture the RTP packets with the SPAN port. You can SPAN the VOIP Gateway port, giving you all the in/out bound traffic. This offers one point of contact for recording. However this method cannot capture internal, peer-to-peer (phone to phone) calls because the VOIP traffic is sent directly between the phones and doesn't flow through the gateway port.

The other method is to set up a VLAN (Virtual LAN) and include all the phones within the VLAN, then use a SPAN to monitor all the phones on that VLAN. This allows recording all in/out bound traffic and internal traffic. The disadvantage is that not all phones at all times are on the same VLAN, so multiple SPANs are often needed.

Multi-site Passive Recording

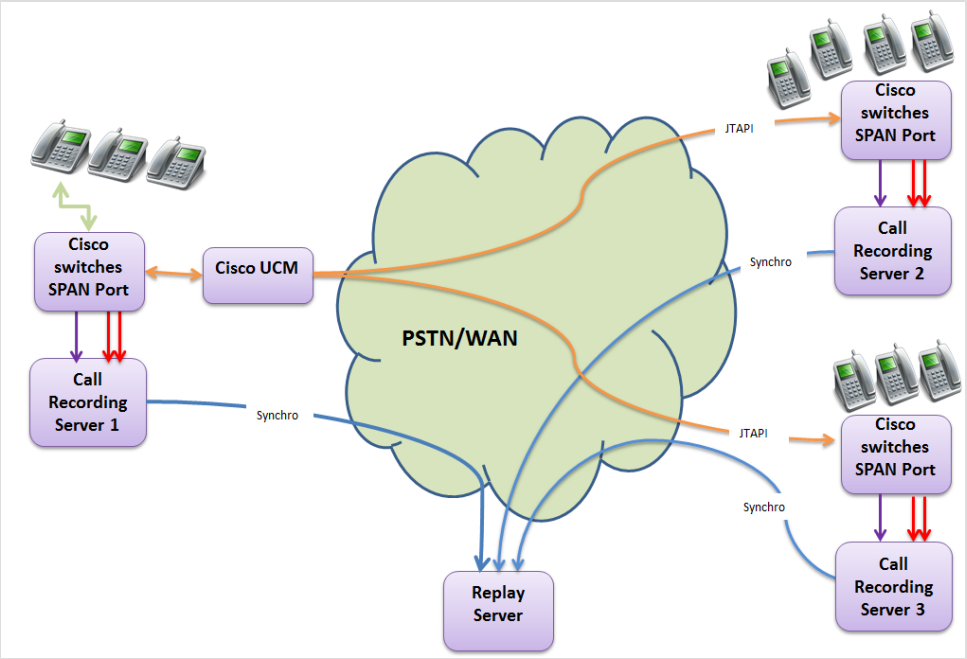


Figure 18: Multi-site Passive Recording with Replay Server

In a multi site deployment for Passive recording of Cisco because the signaling is only available at the SPAN port of each site you must have a recorder on each site. The media recorded is synchronized to a playback server. The recordings for all sites can be played back centrally using the playback server.

SPAN Limitations when using Skinny (SCCP):

- SPAN is difficult to configure.
- Each site requires its own recorder.
- Because the signaling is detected using Cisco Skinny Call Control Protocol (SCCP) not all call scenarios are detected.
- A replay server is required to listen calls from remote offices.
- Monitoring applications have limited scalability
- No call admission control or region-based codec negotiation.
- Using SPAN puts an extra load on the switches.

Passive Recording with JTAPI Signaling

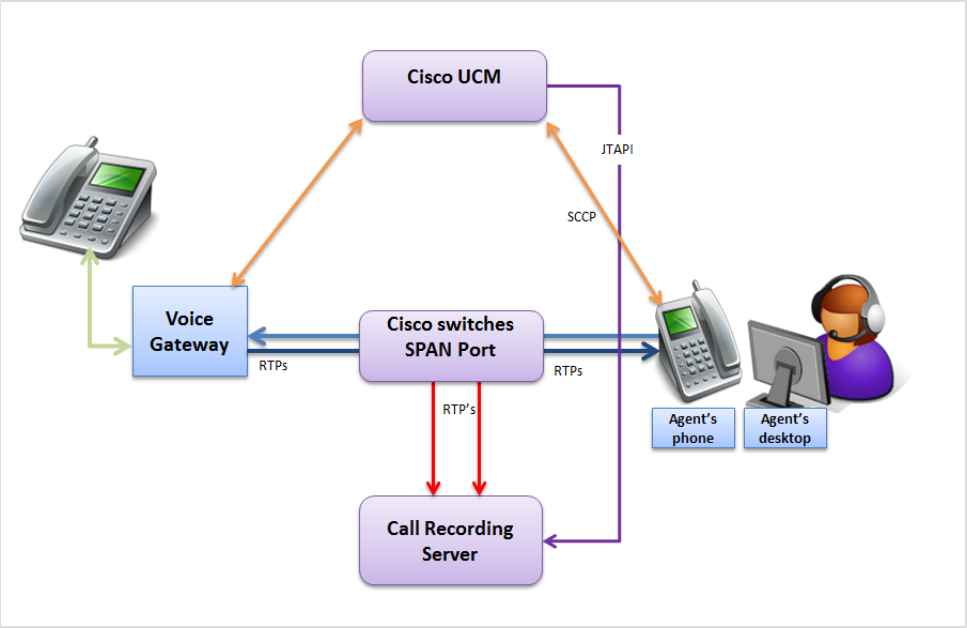


Figure 19: Passive Recording with JTAPI Signaling

Active detection of calls using JTAPI is an enhancement on the purely passive method of recording. Call events are provided by a CTI interface, voice media has to be captured from the network via a SPAN port . Active detection of calls requires interconnection with a softswitch, by utilizing a CTI protocol. Direct support on the softswitch is required to provide call events.

Advantages of Passive with JTAPI:

- By using JTAPI signaling to detect the calls Call Recording can capture the RTP streams for more complicated scenarios such as conferences, see Supported_Call_Scenarios.
- By using RSPAN and VLAN the RTPs can be directed to a switch in another location.

Disadvantages of Passive with JTAPI:

- Using SPAN ports puts an extra load on the switches because all traffic has to be mirrored.
- Branch offices running Call Manager Express only have Skinny signaling and do not use JTAPI so the types of call that can be recorded from these offices are limited.

Cisco Active Recording with JTAPI

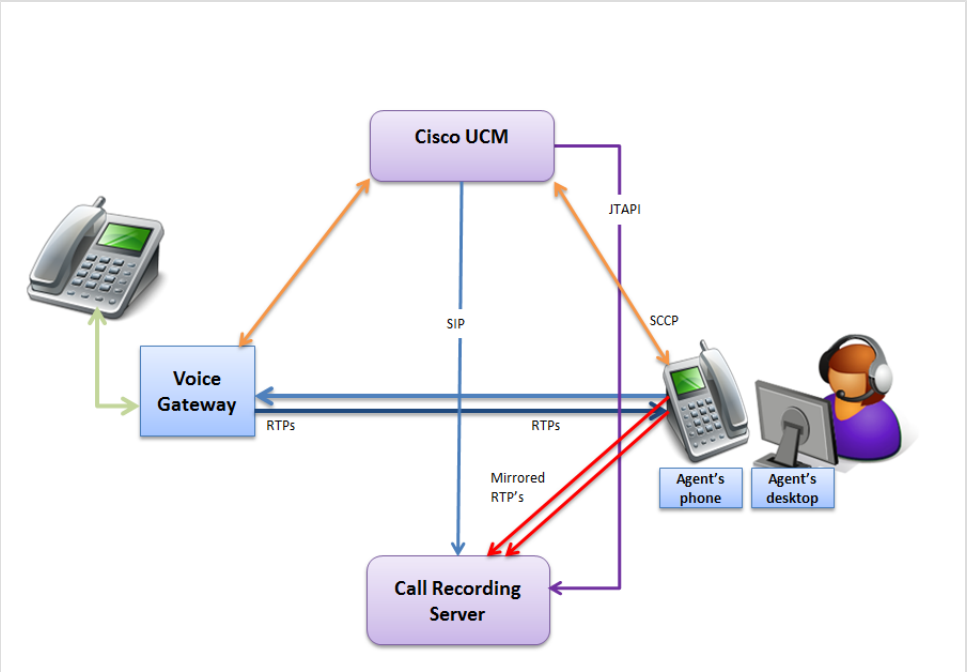


Figure 20: Cisco Active Recording

Active recording captures the call data and call stream through direct connection with the PBX platform. This means the signaling information cannot be lost, and you achieve nearly 100% capture reliability. In addition, other call data contained on the platform can be captured and stored in Call Recording.

Instead of monitoring the stream directly, as in Passive (SPAN) recording, Active recording is controlled through the Cisco Unified Communications Manager, which identifies the calls to be recorded according to recording profiles. When a call with a valid recording profile is detected, the voice stream is copied directly to the Call Recording recorder server. When the calls are decoded, they are immediately available within the Call Recording web based user interface. This recording method is also referred to by Cisco as 'phone based media forking' or 'device based recording'. Active recording through the CUCM does not require the SPAN port to monitor network traffic and identify VoIP traffic. It does require configuration of systems options in the Cisco Unified Communications Manager. This is detailed in the Pre-implementation Guide 8.1.5x, as well as the Cisco Unified Communications Manager Features and Services Guide.

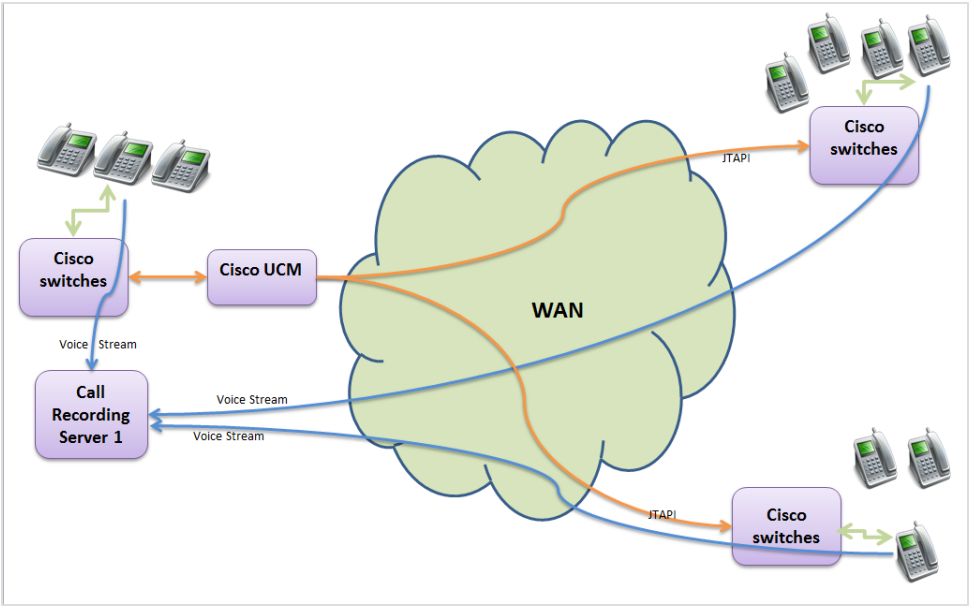


Figure 21: Cisco Active Multi-site

Only Cisco 3G IP phones can be recorded through the Active recording method.

For an up-to-date list of all Cisco phones that support Active Recording see Unified CM Silent Monitoring Recording Supported Device Matrix.

These IP phones must:

- Support Active Recording (silent monitoring).
- Have their built-in bridge enabled.
- Have the Automatic Call Recording Enabled option set in their line appearance.
- Have a valid Recording Profile associated in their line appearance.
- JTAPI signaling must be available.

Advantages of using Active recording:

- Active recording is easy to administrate.
- There is no need for each site to have it's own recorder.
- There is no need for a replay server just to replay remote sites.
- Active recording is adaptable to your network topology.
- Because the PBX is aware of recording it can supply notification tones when legal compliance is required.
- Active recording does not use SPAN ports and so frees resources for

network monitoring.

- Active recording increases reliability and control.

Chapter

6 Inputs for Calculating Requirements

This chapter describes the types of information that you need to provide, to plan the recording solution for your contact center or office.

Important:

Your contact center's data collection requirements, data retention policy and storage estimation are a critical part of the solution design. Please ensure that the inputs you use in this section are as accurate as possible.

You must have the information outlined in the following sections to be able to calculate how much disk space is required to store the media that is recorded. It is far better to over estimate than to underestimate disk space. If you have insufficient storage then you will not be able to record calls after a period of time.

This chapter contains the following sections:

Business Environment

The type of business you have is relevant because each industry has its own requirements for recording.

You may be compelled to record all calls and to comply with regulations for retention of the media, for example, in many countries all financial transactions have to be recorded stored for at least 7 years.

You may require the recordings for training and quality control purposes or to ensure that agents are representing your company properly.

The Number of Sites

If not all the staff work in the same location then it is possible to record calls over multiple sites. It is important to understand the topography of your network and the signaling protocols available to provide the required events that Call Recording requires detection and to record calls. It is also important that the recordings are available where your business needs them.

The Number of Seats

The number of seats is the number of physical terminals where an agent can call or answer a call, usually with an agent desktop (computer). To calculate the maximum capacity and calls per hour we are only interested in the number of seats that you must record including any expected expansion.

We use the number of seats so that we can calculate the maximum capacity so that you have a sufficient number of recorded calls in your Call Recording License to record all the calls without losing any. Theoretically all agents on duty could be speaking at the same time; so unless you cater for all seats you could lose calls.

For a small call center (up to 100 agents), the following is true:

```
number of seats = maximum number of concurrent calls
```

However, you may decide that less than 100% of your agents are likely to be calling at the same time, based on data from your contact center platform.

The Number of Agents

This is the total number of agents. If you run a shift system you will have more agents than seats.

The Average Number of Working Hours per Day per Seat

This is the average total number of hours per day that the contact center operates for, not the number of hours that an individual agent works. For example, if the call center seats are occupied and therefore producing calls for 16 hrs a day, then the average number of working hours per day is 16, even if each agents only works for 8 hours a day. We are interested in the total number of calls per day.

If the number of hours varies then:

```
average number of working hours per day = average number of hours per week /
number of working days
```

The Average Number of Working Days per Month

The average number of working days per month for the call center.

For example if you work 5 days a week all year (52 weeks) and he contact center closes on 15 days of National holidays that occur on working days then this is: `((5 * 52) -15) / 12 = 20.47 working days per month.`

If your call center works national holidays then the calculation is: `(5 * 52) / 12 = 21.72 working days per month.`

Expected Load

The following sections explain how to calculate the expected load of the call centre.

The Number of Calls Recorded per Day

If you have real data from your call center then use this. This information should be available from your contact center software. You need the number of calls recorded per day to plan for the amount of storage required for the media.

If you do not have real data to use then it is possible to provide a rough estimate of the calls per day using the **Calls per day Estimator**.

Storage required per day for calls is calculated as follows:

```
(the number of calls per day) * (the average length of call) * (multiplying
factor for bitrate and media format)
```

If you are capturing screens then you must add this to the storage required.

The Maximum Load

Maximum load occurs when the maximum possible number of available agents are engaged in calls. In a fully occupied contact center this will usually be close to the number of seats. For example, if you have 100 agent seats and at the peak all of the agents are engaged in calls then the maximum load is 100 concurrent calls. Your call center software should be able to provide you with information on maximum load.

The Average Call Length in Seconds

Your call center software should be able to provide a report of the average length of call. Be careful to exclude any data concerning calls that do not need to be recorded.

```
average length of call = total duration of calls in seconds / number of
calls.
```

Wrap-up (After Call Work)

Wrap-up or After Call Work is post-call clerical work which a contact center agent completes after the call has ended. This figure is important because all the time that an agent is performing after call work they cannot be on a call but you may wish to record screen captures.

The Average Handle Time

The total amount of time from when the call starts until the agent wraps up including any hold time.

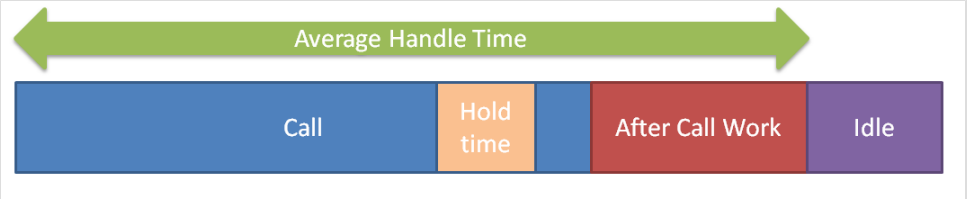


Figure 22: Average Handle Time

Idle time

Idle time is any time when the agent is not calling or performing after call work.

Media Storage

Media storage is one of the most important factors to plan because the media files accumulate rapidly and if you do not have any available storage then you cannot record any more media.

The Length of Time to Store Calls on the Recording Server

How long you need to store calls for depends on what sort of contact center you have and whether there are laws that mandate a certain length of storage.

If there are no laws that mandate how long the media must be stored then your company will have a policy on retention of records. You only need to store the media on the recorder server for the duration of time that you need to access the media quickly. You can archive, relocate or backup the media files and then delete them from the recorder server using the media lifecycle tools provided with Call Recording.

The Length of Time to Store Screen Captures on the Recording Server

The length of time you need to store screen captures is usually shorter than for calls.

Percentage of Screens to Capture

You may not need to capture 100% of screens. To reduce the amount of media stored you can record just a representative percentage of screens (each captured screen is associated with a call). The percentage of screens recorded is set in the recording rules and itself is dependent on the percentage of calls recorded. For example, if you have 100 calls and you record 50% of all calls and record 20% of screens then you will record ten screens.

Screen Resolution

The higher the screen resolution is, then the larger the media file for screen capture is. If the screens captured are low resolution then the media file is smaller. The bitrate is variable, because the capture technology uses MPEG compression technology. The more each screen capture differs from the previous screen capture then the larger each capture will be.

MP4 Storage Calculation

```
video bitrate = Dx * Scale/100 * Dy * Scale/100 * FR * Q
```

Where:

- `Dx` is the X axis of the desktop size in pixels, for example, 1024.
- `Dy` is the Y axis of the desktop size in pixels, for example, 768.
- Scale is the scale of resulting video in % (default = 100; range 20 - 100).
- `FR` is the video frame rate in frames per second, fps) (default =1; range 0.5 - 5).
- `Q` is the quality coefficient (default = 0.25; max = 0.5, high = 0.25; medium = 0.2; low = 0.125).

audio bitrate = MP3 bitrate (24 kbps)or 32 kbps for wav.
MP4 bitrate = `video bitrate + audio bitrate`.
MP4 size = `(video length * video bitrate + audio length * audio bitrate) * (1 + overhead)`

... where the `overhead` coefficient is about 0.002% of the MP4 size.

Call Recording License Requirements

To operate your GQM you must have sufficient **Registered Terminals**, **Recorded Calls** and **Concurrent Screens** attributes in your license.

Registered Terminals

For Cisco JTAPI there must be sufficient **Registered Terminals** in the Call Recording License for every recorded agent seat. If you have 100 agents and a license with only 50 agent seats then Call Recording will only register a maximum of 50 agents.

If you are not using Cisco JTAPI then **Registered Terminals** does not apply.

Concurrent Calls

Concurrent calls are the number of observed terminals. To ensure that all seats are observed the number of concurrent calls should be the same as the total number of seats.

Concurrent Screens

This is the maximum number of screens that can be recorded at once.

Recorded Calls

It is important that the Call Recording Licence properties have sufficient **Recorded calls** to record all the agents that need to be recorded. If you have 100 agents and a license with only 50 recorded calls then Call Recording will only record a maximum of 50 agents at one time.

Chapter

7 Planning Hardware Requirements

In the sections that follow, there are examples of the components and hardware requirements for different sizes of call recording solutions. However, critical factors related to network and I/O conditions are examined first.

This chapter contains the following sections:

IOPS

A very important parameter in GQM storage performance is Input/Output Operations Per Second (IOPS).

Recording is the most demanding operation for storage systems in GQM. Recording storage should always be independent from other storage if the IOPS limit is being approached.

Each call recording requires around 4 IOPS, so for 500 concurrent calls this is around 2000 IOPS.

The Decoder requires 3 I/O operations during operation, while a local database and Screen Capture add further I/O operations.

The GQM database is very demanding on both storage and CPU capacity, particularly if Quality Manager is installed and is heavily used for evaluations. We recommend that for large installations, the database should be running on a separate server.

Typical IOPS values for current HDD drives are as follows - only fast SAS drives should be considered for call recording storage.

7,200 rpm SATA drives HDD ~75-100 IOPS[2] SATA 3 Gb/s

10,000 rpm SATA drives HDD ~125-150 IOPS[2] SATA 3 Gbit/s

10,000 rpm SAS drives HDD ~140 IOPS [2] SAS

15,000 rpm SAS drives HDD ~175-210 IOPS [2] SAS

Solid State Drives (SSD) offer much higher IOPS performance, so are an ideal candidate for the role as a call recording cache (short term storage, before calls are archived to permanent storage consisting of slower HDD drives).

Network Requirements

The following factors are critical in determining the response and quality of an IP-based call recording system:

Latency: Latency is a measure of time delay experienced in a system.

Jitter: Jitter is the variability over time of the packet latency across a network.

Bandwidth: Bandwidth is rate of data transfer, bit rate or throughput, measured in bits per second (bps).

Network throughput in a multi-server environment is essential, particularly where the NFS (Network File System) is used. Network throughput is characterized by a combination of the bandwidth - usually 100 Mbit/sec or 1 Gbit/sec - and the latency. Higher jitter factors, where in the worst case packets are lost during transit, also negatively affect the throughput.

Resources shared between servers can also affect throughput, such as:

- A decoder loading recorded calls over the network
- SQL queries and result sets
- Call data in transit to network storage

Taking these examples, we will look at how network throughput can be affected in each case.

NFS Performance

NFS performance degradation is caused by the following:

- Network connection speed much lower than the local disk connection (SAS has 3-6 Gbits / sec).
- No caching (the file being loaded over the network could be modified any time by another process).
- Network latency being much higher than local latency (all switches / routers on the way, and so on).
- Network overhead being much higher than local transfer. The worst case is transferring a large number of small files.

Database Performance

Database performance is dependent on the distribution of CPU, RAM and storage:

- Small database queries (SQL Selects) produce potentially huge results, which need to be transferred across the network.

Call Data

- Calls that are delivered to recorders over the same network interface reduce the network bandwidth available for other network services.
- There is always a tradeoff between sharing resources (CPU, RAM, storage) and limitations imposed by the network.

In summary, it is beneficial to ensure that a multi-server implementation shares resources and distributes load (to obtain more CPU horsepower, for example), but this is dependent on the servers being connected to a network that is fast enough to deliver data without allowing servers to enter an idle state, waiting for further tasks.

Call Scenarios

In the following scenarios, Call Recording services are referred to by the following acronyms:

- **RMI**: Remote Method Invocation. The RMI is used to communicate between modules.
- **CONFIG**: The Configuration Manager.
- **CORE**: The central Call Recording control module.
- **RS**: SPAN recorder.
- **SLR**: Active recorder.
- **DECODER**: decoder server.
- **CC IM**: Contact Center Integration Module, for example, and Genesys CIM.
- **TOOLS**: Media Lifecycle Management tools, for example, the Archive utility.
- **WEB UI**: Call Recording Web-based user/administration interface.
- **DATABASE**: The main call information database.
- **RTS**: Real-time protocol sniffer (for example, JTAPI, SIP, Skinny).

Recommendations for All Configurations

If a server with CentOS or RedHat 32 bit has more than 4 GB RAM, make sure that the Physical Address Extension (PAE) enabled kernel is installed.

If the storage system causes a bottleneck in Call Recording performance, especially during peak hours, use a fast SLC SSD as a write through cache where the recorded files are stored in addition to the slower permanent storage (based on HDD).

The size of the SSD cache should be at least as large as the amount of data recorded during the peak hours of one business day.

Record up to 50 Concurrent Calls - Call Recording Only

The recommended server hardware configuration for 50 concurrent calls is as follows:

Call Recording Only - 50 Calls	
Running Services:	RMI, CONFIG,CORE, RS/SLR, DECODER, CC IM, TOOLS, WEB UI, DATABASE, RTS
CPU	Dual core (Intel CORE2) processor 2.0Ghz or better
RAM	4 GB RAM minimum
HDD	2x Drives RAID 1, 7,200 rpm (approximately 200 IOPS required)
Network Cards	2x 100 Mb Ethernet minimum for Passive recording 1x 100 Mb Ethernet minimum for Active recording
Storage Example	
Average length of calls	180 seconds
Average handle time	270 seconds (90 seconds After Call Work)
Maximum concurrent calls	50
Number of calls a day	4800 for an 8 hour day
Percentage of calls recorded	100%
Storage required for one month of mp3 media	86 GB + 20GB for system
Storage required for 12 months of mp3 media	1 TB +20 GB for system

Table 3: Up to 50 Concurrent Calls

Record up to 100 Concurrent Calls - Call Recording Only

The recommended server hardware configuration is as follows:

Call Recording Only - 100 Calls	
Running Services:	RMI, CONFIG, CORE, RS/SLR, DECODER, CC IM, TOOLS, WEB UI, DATABASE, RTS
CPU	Quad core (Intel CORE2) 2.0Ghz or better
RAM	4 GB Minimum, 8 GB Recommended
HDD	4x 10,000 rpm Hard Drive, RAID 10 (approximately 400 IOPS required)
Network Cards	2x 100 Mb Ethernet minimum for Passive recording 1x 100 Mb Ethernet minimum for Active recording
Storage Example	
Average length of calls	180 seconds (3 minutes)
Average handle time	270 seconds
Maximum concurrent calls	100
Number of calls a day	9600 for an 8 hour day
Storage required for one month of mp3 media	180 GB + 20GB for system
Storage required for 12 months of mp3 media	2.2 TB + 20 GB for system

Table 4: 100 Concurrent Calls - Call Recording only

Record up to 100 Concurrent Calls - Call Recording and Quality Manager

This scenario assumes that there will be around 10 supervisors (one supervisor to every ten agents) accessing Quality Manager simultaneously. The recommended server hardware configuration is as follows:

Call Recording and Quality Management (Quality Manager) - 100 Calls	
Running Services:	RMI, CONFIG,CORE, RS/SLR, DECODER, CC IM, TOOLS, WEB UI, DATABASE, RTS
CPU	Intel Quad Core 55XX 2.0Ghz or better (4 Cores)
RAM	16GB RAM
HDD	4x RAID 10, 10,000 rpm Hard Drive
Network Cards	2x 100 Mb Ethernet minimum for Passive recording 1x 100 Mb Ethernet minimum for Active recording
Storage Example	
Average length of calls	180 (3 min)
Average handle time	270 seconds (4.5 minutes)
Maximum concurrent calls	100
Number of calls a day	9600
Storage required for one month of mp3 media	180 GB + 20GB for System
Storage required for 12 months of mp3 media	2.2 TB + 20GB for System
Storage required for Quality Manager Database	20 GB

Table 5: 100 Concurrent Calls - Call Recording + Quality Manager

Record up to 250 Concurrent Calls - Call Recording Only

The recommended server hardware configuration is as follows:

Call Recording Only - 250 Calls	
Running Services:	RMI, CONFIG,CORE, RS/SLR, RTS, DECODER, CC IM, TOOLS, WEB UI, DATABASE
CPU	Intel Quad Core 55XX 2.3 Ghz or better
RAM	8 GB Minimum
HDD	Two options for recording cache (approx 1000 IOPS required): 1. SSD having a total minimum 1,000 IOPS using 4 kB blocks 2. 4x SAS 10,000 rpm for RAID 10 partition with write cache enabled to decrease HDD IOPS Dedicated HDD for permanent storage: 4 x 7200 rpm for RAID 10
Network Cards	2x 1 Gigabit Ethernet
Storage Example	
Average length of calls	180 seconds
Average handle time	270 seconds
Maximum concurrent calls	250
Number of calls a day	24,000 for an 8 hour day
Percentage of calls recorded	100%
Storage required for one month of mp3 media	450 GB + 20GB for system
Storage required for 12 months of mp3 media	5.4 TB + 20GB for system

Table 6: 250 calls, Call Recording only

Record up to 250 Concurrent Calls - Call Recording and Quality Manager

This scenario assumes that there will be around 25 supervisors (one supervisor to every ten agents) accessing Quality Manager simultaneously. This solution requires two servers:

- Server 1: Call Recording recording and decoding modules
- Server 2: Quality Manager including database, MLM Tools and Call Recording Web GUI

The recommended server hardware configuration is as follows:

Server 1: Call Recording - 250 Calls	
Running Services:	RMI, CONFIG,CORE, RS/SLR, RTS, DECODER, CC IM
CPU	Intel Quad Core 55XX 2.3 Ghz or better
RAM	8 GB Minimum, 16 GB Recommended (If Scorecard is used heavily, add more RAM (to 32 GB) and allow PostgreSQL to use more RAM)
HDD	Two options for recording cache (approx 1000 IOPS required for recording, additional IOPS produced by Scorecard) 1.SSD having a total minimum 1,000 IOPS using 4 kB blocks 2. 4x SAS 10,000 rpm for RAID 10 partition with write cache enabled to decrease HDD IOPS Additional HDD requirements are produced in relation to how heavily (and when - if off peak or during peak hours) Quality Manager is used. If more concurrent users use Quality Manager, it is recommended to deploy the database on a separate HDD. Dedicated HDD for permanent storage: 4 x 7,200 rpm for RAID 10
Network Cards	2x 1 Gigabit Ethernet
Storage Example	
Average length of calls	180 seconds
Average handle time	270 seconds

Server 1: Call Recording - 250 Calls	
Maximum concurrent calls	250
Number of calls a day	24,000 for an 8 hour day
Percentage of calls recorded	100%
Storage required for one month of mp3 media	450 GB + 20GB for system
Storage required for 12 months of mp3 media	5.4 TB + 20GB for system

Table 7: Server 1 for 250 calls, Call Recording and Quality Manager

Server 2: Quality Management (Quality Manager)	
Running Services:	RMI, TOOLS, WEB UI, DATABASE
CPU	Intel Quad Core 55XX 2.0Ghz or better
RAM	32 GB RAM
HDD	Fast storage: 4 x 10,000 rpm for RAID 10
Storage required for Quality Manager Database	200 GB to support external data.

Table 8: Server 2 for 250 calls, Call Recording and Quality Manager

Record up to 400 Concurrent Calls - Call Recording Only

The recommended server hardware configuration is as follows:

Call Recording Only - 400 Calls	
Running Services:	RMI, CONFIG,CORE, RS/SLR, RTS, DECODER, CC IM, TOOLS, WEB UI, DATABASE
CPU	Intel 8 Core XEON (or dual socket Intel XEON Quad Core) 2.3 Ghz or better
RAM	16 GB Minimum
HDD	Two options for recording cache (approx 2000 IOPS required by recording in peaks): 1. SSD having as a total minimum 2,000 IOPS. 2. 4x SAS 15,000 rpm for RAID 10 partition with write cache enabled to decrease HDD IOPS to acceptable levels or combination of both as a ideal candidate: SSD as a fast write through cache and HDD RAID 10 as a permanent storage.
Network Cards	2x 1 Gigabit Ethernet
Storage Example	
Average length of calls	180 seconds
Average handle time	270 seconds
Maximum concurrent calls	400
Number of calls a day	38,400 for an 8 hour day
Percentage of calls recorded	100%
Storage required for one month of mp3 media	720 GB + 20GB for system
Storage required for 12 months of mp3 media	8.8TB + 20GB for system

Table 9: 500 calls, Call Recording only

Record up to 400 Concurrent Calls - Call Recording and Quality Manager

This scenario assumes that there will be around 50 supervisors (one supervisor to every ten agents) accessing Quality Manager simultaneously. This scenario requires two servers:

- Server 1: Call Recording recording and decoding modules
- Server 2: Quality Manager including database, MLM Tools and Call Recording Web GUI

The recommended server hardware configuration is as follows:

Server 1: Call Recording - 400 Calls	
Running Services:	RMI, CONFIG,CORE, RS/SLR, RTS, DECODER, CC IM
CPU	Intel 8 Core XEON (or dual socket Intel XEON Quad Core) 2.3 Ghz or better
RAM	16 GB Minimum
HDD	Two options for recording cache (approx 2000 IOPS required by recording in peaks): 1. SSD having as a total minimum 2,000 IOPS. 2. 4x SAS 15,000 rpm for RAID 10 partition with write cache enabled to decrease HDD IOPS to acceptable levels or combination of both as a ideal candidate: SSD as a fast write through cache and HDD RAID 10 as a permanent storage.
Network Cards	2x 1 Gigabit Ethernet
Storage Example	
Average length of calls	180 seconds
Average handle time	270 seconds
Maximum concurrent calls	400
Number of calls a day	38,400 for an 8 hour day
Percentage of calls	100%

Server 1: Call Recording - 400 Calls	
recorded	
Storage required for one month of mp3 media	720 GB + 20GB for system
Storage required for 12 months of mp3 media	8.8 TB + 20GB for system

Table 10: Server 1 for 500 calls, Call Recording and Quality Manager

Server 2: Quality Management (Quality Manager)	
Running Services:	RMI, TOOLS, WEB UI, DATABASE
CPU	Intel XEON Quad Core 2 Ghz or better
RAM	32 GB RAM
HDD	Fast storage: 4 x 10,000 rpm for RAID 10
Storage required for Quality Manager Database	400 GB to support external data.

Table 11: Server 2 for 500 calls, Call Recording and Quality Manager

Additional Screen Capture Requirements

Screen Capture deployments will require the following hardware specifications in addition to the Call Recording or Call Recording+ Quality Manager scenarios outlined earlier.

The following figures are calculated using the assumption that the estimated bandwidth required for one Screen Capture session is 400kbits/s.

ScreenREC Sessions	CPU	MEM	HDD
Up to 500	1x Quad (2.5GHz+)	8GB RAM	2xHDD [RAID 1]
Up to 1000	2x Quad (2.5GHz+)	8GB RAM	4xHDD [RAID 10]

Table 12: Additional requirements for Screen Capture

Modular Solution for 1000 Concurrent Calls

This scenario distributes Call Recording, Quality Manager and Screen Capture modules (if required) between four or five servers, which have a similar hardware configuration, differing only in allocated RAM. It is assumed that active recording will be implemented:

- Server 1: Config, Call Recording Core, Decoder, Active Recorder
- Server 2: Slave Decoder, Active Recorder
- Server 3: Slave Decoder, Active Recorder
- Server 4: Web Server including Quality Manager, Database, MLM Tools. If Quality Manager is not required, only half the RAM is needed.
- Server 5: Screen Capture Media Upload Server

The recommended server hardware configuration for these servers is as follows:

Server 1: Main Recorder / Decoder	
Running Services:	RMI, CONFIG,CORE, SLR, DECODER
CPU	Intel XEON Quad Core E55XX 2.3 Ghz or better
RAM	16 GB RAM
HDD	Fast storage: 4 x 10,000 rpm for RAID 10

Table 13: Server 1 for 1000 Concurrent Calls

Servers 2 and 3: Slave Recorder / Decoder	
Running Services:	RMI, SLR, DECODER
CPU	Intel XEON Quad Core E55XX 2.3 Ghz or better
RAM	8 GB RAM
HDD	Fast storage: 4 x 10,000 rpm for RAID 10

Table 14: Servers 2 and 3 for 1000 Concurrent Calls

Server 4: Web Server, Database, Tools	
Running Services:	RMI, DATABASE, WEB, TOOLS
CPU	Intel XEON Quad Core E55XX 2.3 Ghz or better
RAM	32 GB RAM
HDD	Fast storage: 4 x 10,000 rpm for RAID 10

Table 15: Server 4 for 1000 Concurrent Calls

Server 5: Screen Capture	
Running Services:	RMI, Screen Capture
CPU	Intel XEON Quad Core E55XX 2.3 Ghz or better
RAM	8 GB RAM
HDD	Fast storage: 4 x 10,000 rpm for RAID 10

Table 16: Server 5 for 1000 Concurrent Calls

The overall recording parameters and storage requirements for this configuration are in the table below.

Recording Parameters	
Average length of calls	180 seconds
Average handle time	270 seconds
Maximum concurrent calls	1000
Number of calls a day	96,000 for an 8 hour day
Percentage of calls recorded	100%
Storage required for one month of mp3 media	1.8 TB + 20GB for system
Storage required for 12 months of mp3 media	22 TB + 20GB for system

Table 17: Recording Parameters for 1000 calls

Chapter

8 Hardware Platforms and Sizes

This section deals with examples of servers that are available from several manufacturers that are available for your recording needs.

This chapter contains the following sections:

Sizes

Small

Small/remote sites (up to 100 calls)

Distributed deployments – servers without storage (RS, DS, RTS)

Medium

Medium size sites (up to 250 calls) – 2 servers

Distributed deployments – higher processing power demands – DS

Large

DB and Storage for Replay Server

Difference with Medium size server is just disk space (and/or SAN/NAS)

Hardware Platforms

	Small	Medium	Large
HP	ProLiant DL320 G6	ProLiant DL360 G7	ProLiant DL380 G7 + StorageWorks D2600/D2700
IBM	IBM x3250 M3	IBM x3550 M3	IBM x3550 M3 + Storage DS3500
DELL	PowerEdge R310	PowerEdge R510	PowerEdge R710 + PowerVault MD3200

Table 18: Hardware Platforms

HP Details

Small server - ProLiant DL320 G6

- Max. 1 CPU (2 or 4 core), max. 96GB RAM
- 2 NIC, 2 expansion slots
- Up to 4 LFF or 8 SFF SAS/SATA/SSD disks - up to 2.4TB – RAID10 with 600GB HDDs

Medium server - ProLiant DL360 G7

- Max. 2 CPU (2, 4 or 6 core), max. 192GB RAM
- 2 NIC, 2 expansion slots
- Up to 8 SFF SAS/SATA/SSD disks - up to 2.4TB – RAID10 with 600GB HDDs

Large server - ProLiant DL380 G7

- Max. 2 CPU (2, 4 or 6 core), max. 192GB RAM
- 2 NIC, 6 expansion slots
- Up to 16 SFF SAS/SATA/SSD disks (with optional 2nd drive cage) - up to 8.4TB – RAID5 with 600GB HDDs, but external NAS/SAN storage recommended.

IBM Details

Small server – IBM System x3250 M3

- Max. 1 CPU (2 or 4 core), max. 32GB RAM
- 2 NIC, 2 expansion slots
- Up to 2 LFF or 4 SFF SAS/SATA/SSD disks - up to 1.2TB – RAID10 with 600GB HDDs

Medium server - IBM System x3550 M3

- Max. 2 CPU (2, 4 or 6 core), max. 192GB RAM
- 2 NIC, 2 expansion slots
- Up to 8 SFF SAS/SATA/SSD disks - up to 2.4TB – RAID10 with 600GB HDDs

Large server - IBM System x3630 M3

- Max. 2 CPU (2, 4 or 6 core), max. 96GB RAM
- 2 NIC, 3 expansion slots
- Up to 24 SFF SAS/SATA/SSD disks - up to 11TB – RAID5 with 500GB HDDs, but external NAS/SAN storage recommended

Dell Details

Small server – PowerEdge R310

- Max. 1 CPU (2 or 4 core), max. 32GB RAM
- 2 NIC, 2 expansion slots
- Up to 4 LFF/SFF SAS/SATA/SSD disks - up to 1.2TB – RAID10 with 600GB HDDs

Medium server - PowerEdge R510

- Max. 2 CPU (4 or 6 core), max. 128GB RAM
- 2 NIC, 4 expansion slots
- Up to 14 SFF SAS/SATA/SSD disks - up to 7.2TB – RAID5 with 600GB HDDs

Large server – PowerEdge R710

- Max. 2 CPU (4 or 6 core), max. 192GB RAM
- 2 NIC, 4 expansion slots
- Up to 8 SFF SAS/SATA/SSD disks - up to 2.4TB – RAID10 with 600GB HDDs, but external NAS/SAN storage recommended.

Chapter

9 Request Technical Support

Technical Support from VARs

If you have purchased support from a value-added reseller (VAR), contact the VAR for technical support.

Technical Support from Genesys

If you have purchased support directly from Genesys, please contact http://genesyslab.com/support/contact Genesys Technical Support.