



# Cisco Unified Workforce Optimization

Quality Management Design Guide Version 11.5

First Published: July 28, 2016

Last Updated: May 15, 2018

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Quality Management Design Guide

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# Overview

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This document describes how Cisco Unified Workforce Optimization Quality Management is designed and covers the following topics:

- Cisco environment
- System architecture
- Capture and recording methods
- Resiliency options





# Cisco Environment

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Cisco Quality Management supports Cisco Unified Contact Center Express (CCX).

Use Cisco Unified Contact Center Express (Unified CCX) when your contact center is fewer than or equal to 400 seats. From a Cisco Quality Management perspective, Unified CCX the routing engine that provides agent, team, supervisor, and real-time information.

## System Architecture for Unified CCX

For a Cisco environment running Unified CCX, Quality Management supports a single system architecture. This architecture is able to use the following optional external servers to store voice and screen recording files.

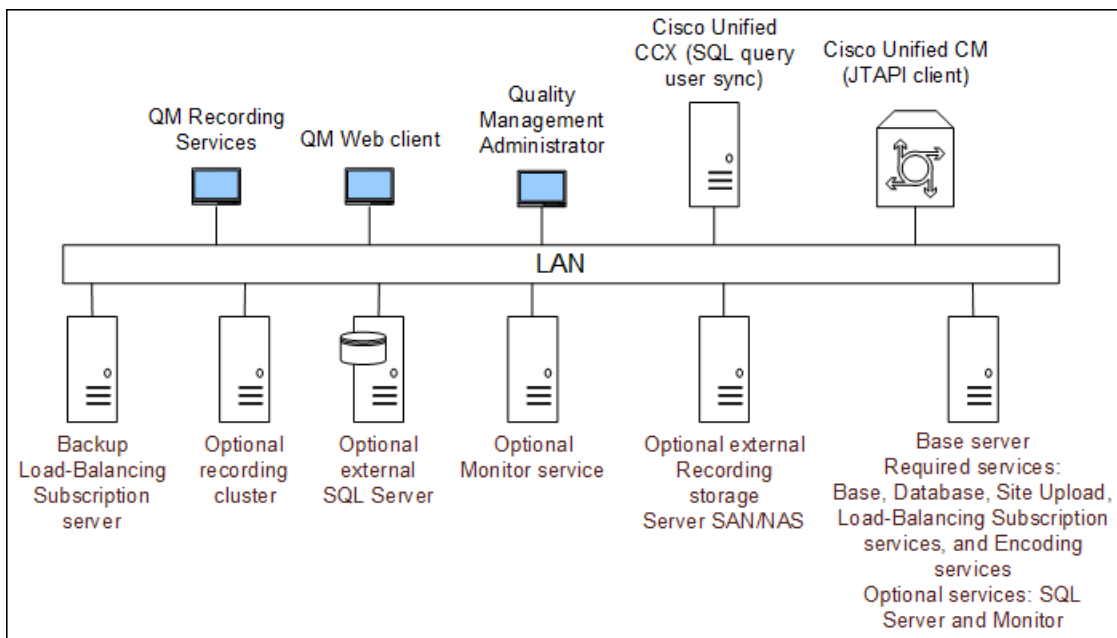
- Recording Server—to store voice and screen recording files
- Media Encoding server—to managing recording requests
- Monitor server—to monitor agents

In a Cisco environment, Cisco Quality Management requires one dedicated CTI server for each Unified CM cluster in a Unified CCX environment.

**Example:** If there are two Unified CM clusters, then there must be two Recording CTI servers.

## Single Server Architecture for Unified CCX

The following figure show an example of a single server architecture for Cisco Unified CCX.



## CTI

Computer Telephony Integration (CTI) enables you to leverage computer-processing functions while making, receiving, and managing telephone calls. CTI applications allow you to perform such tasks as retrieving customer information from a database based on information provided by caller ID. CTI applications can also enable you to use information captured by an interactive voice response (IVR) system, so that the call can be routed to the appropriate customer service representative or so that the information is provided to the individual receiving the call.

## Unified CM

Unified CM provides the signaling and controls the voice and state of the phone in a Unified CCX environment.

The signaling service receives call event notifications from Unified CM via JTAPI.

Cisco also supports Cisco Unified CM standalone, where Unified CM is installed without Unified CCX.

## Unified CM Cluster

A Unified CM cluster comprises a set of Unified CM servers that share the same database and resources and has one or more CTI Managers. The CTI Manager is a service that runs on Unified CM and handles JTAPI events for every Unified CM in the cluster.

You can specify a primary and backup CTI Manager through Cisco Quality Management. Any Unified CM that has the CTI Manager running on the subscriber can be your primary or backup CTI Manager.

**Note:** You can configure any machine as the primary CTI Manager, but it is a good idea to avoid using the publisher, because it already has the highest load. Using another server as the primary CTI Manager helps avoid decreasing the Unified CM performance.

A Unified CM cluster consists of one publisher and up to eight subscribers. If you have more than eight subscribers, you need additional Unified CM clusters.

The publisher administers subscribers in a Unified CM cluster. This is the configuration engine. IP phones are registered to the subscriber.

## Cisco Desktop Environment

The Cisco Desktop environment consists of the following components:

- Cisco Agent Desktop
- CTI OS
- Cisco Finesse

Cisco Agent Desktop for Unified CCX and Hosted, Windows client edition, is a robust computer telephony integration solution that is easy to install, configure, and manage. It provides agents with powerful tools to increase productivity, reduce operational costs, and improve customer satisfaction.

Cisco Agent Desktop provides call control capabilities—such as call answer, hold, conference, and transfer, and ACD state control—ready/not ready, wrap up, etc. Customer information is presented to the agent through an enterprise data window and an optional screen pop.

In a Unified CCX environment, Cisco Agent Desktop requires minimum screen real estate and enables agents to customize its functionality to meet their individual needs. The optional integrated browser enables agents to access intranet and internet web pages to enhance their ability to assist customers. The optional integration with Cisco Unified Presence makes it possible for agents to send instant messages to non-agent subject matter experts to help them assist customers.

Cisco Agent Desktop is a client/server application. It is a packaged product that cannot be customized. See the *Integration Guide* for CAD and Finesse for information on integrating Cisco Agent Desktop with Cisco Quality Management via the Recording Controls API.

The Cisco Customer Telephony Integration Object Server (CTI OS) introduces programmers to developing CTI enabled applications with CTI OS, and describes the syntax and usage for CTI OS methods and events. CTI OS is a client/server application that ships with a basic desktop as an API. It can be customized.

Cisco Finesse is a next-generation agent and supervisor desktop designed to provide a collaborative experience for the various communities that interact with your customer service organization. It helps improve the customer experience while offering a user-centric design to enhance customer care representative satisfaction as well Cisco Finesse is a web-based agent desktop that can be customized.

It replaces CAD and CTI OS. See the *Integration Guide for CAD and Finesse* for information on integrating Cisco Finesse with Cisco Quality Management via the Recording Controls API.

## Cisco Licensing Considerations

There is no additional licensing required from Cisco to work with Cisco Quality Management.

## Supported IP Phones in a Cisco Environment

**Note:** These Cisco documents mentioned below are available on the website ([www.cisco.com](http://www.cisco.com)). Not all of the phones listed in these documents are compatible with Cisco Quality Management. Phones have to be qualified to work with Cisco Quality Management before you install Cisco Quality Management.

The following table lists the supported phones by feature.

Feature	Supported Phones
Desktop Recording	<p>All phones used by Cisco Quality Management for Desktop Recording must support endpoint monitoring. Hard IP phones require a PC port.</p> <p>See the following Cisco documents for the list of IP phones that support Desktop Recording:</p> <ul style="list-style-type: none"> <li>▪ "Endpoint Devices" in <i>Unified CCX Software Compatibility Matrix</i></li> </ul>
Server Recording	<p>Any Cisco IP phones that can be controlled by CTI and are connected to a SPAN-enabled switch are supported.</p> <p>For a list of supported IP phones in a Cisco environment, see the following document:</p> <ul style="list-style-type: none"> <li>▪ <i>Cisco Unified Contact Center Express (Cisco Unified CCX) Software and Hardware Compatibility Guide</i></li> </ul>
Network Recording	<p>See the <i>Unified CM Silent Monitoring/Recording Supported Device Matrix</i> for a list of IP phones that are supported for Network Recording.</p>
Network Based Recording	<p>See the <i>Unified CM Silent Monitoring/Recording Supported Device Matrix</i> for a list of IP phones that are supported for Network Based Recording.</p>

Feature	Supported Phones
MediaSense Recording	See the <i>SRND for Cisco MediaSense</i> for a list of IP phones that support MediaSense Recording.
Live Monitoring	<p>The following phones support Live Monitoring: 7906, 7911, 7931, 7941, 7942-G, 7945-G, 7961, 7962-G, 7965-G, 7970, 7971, 7975-G, 78x1, RT Entry, 8941-RT, 8961-RT Standard Plus, 9951-RT Business, 9871-RT, 6911-RT Lite, 6921-RT lite, 6941-RT Lite, 6945-RT Lite, 6961-RT Lite, 6951-RT Lite</p> <p>The following phones support Whisper coaching: 7906, 7911, 7931, 7941, 7942-G, 7945-G, 7961, 7962-G, 7965-G, 7970, 7971, 7975-G, 78x1, RT Entry, 8941-RT, 8961-RT Standard Plus, 9951-RT Business, 6911-RT Lite, 6921-RT lite, 6941-RT Lite, 6945-RT Lite, 6961-RT Lite, 6951-RT Lite</p> <div data-bbox="591 764 1385 995" style="background-color: #e6f2e6; padding: 10px;"><p><b>Important:</b> The Whisper feature in Live Monitoring requires a phone that supports Whisper coaching. If you try to use the Whisper feature on an unsupported phone, the customer might be able to hear the manager or supervisor while they are coaching the agent.</p></div> <p>Live Monitoring also supports Cisco IP Communicator version 8.6.3.0.</p>

Feature	Supported Phones
Cisco IP Communicator	<p>When configuring phone names for Cisco IP Communicator, consider the following:</p> <ul style="list-style-type: none"> <li>■ The MAC address for Cisco IP Communicator must not include periods or hyphens.</li> <li>■ For Desktop Recording: <ul style="list-style-type: none"> <li>• The phones' device names must be the computer's MAC address and the MAC address must begin with SEP.</li> <li>• The MAC on the desktop's NIC should be the same configured device name specified in Cisco Unified CM.</li> <li>• Running IP Communicator on a desktop or laptop connected to the network through a wireless adapter is not supported.</li> </ul> </li> <li>■ For Network Recording, Network Based Recording, and Server Recording, verify the phones' device names begin with SEP or CSF. Only phones with device names that begin with SEP or CSF can be configured from the VoIP Devices window in Quality Management Administrator.</li> <li>■ For Cisco MediaSense Recording, Verify all phones' device names begin with SEP. If the phones' device names do not begin with SEP, you will not be able to find them when you search for devices from the VoIP Devices window in Quality Management Administrator</li> </ul>
Cisco Jabber	<p>Cisco Jabber is not supported when using Desktop Recording behind a virtual private network (VPN) connection.</p> <p>If you are using Desktop Recording, the phones' device names must be the computer's MAC address and the MAC address must begin with SEP.</p>

## Supported Cisco Unified Outbound Dialer Modes

Cisco Quality Management supports the Direct Preview dialing mode.

## Shared Lines

Cisco supports shared lines. A shared line is a phone number that is used between two or more IP phones at the same time.

When using shared lines with Cisco MediaSense, Cisco MediaSense will save every recording for each user that has a shared line on their phone. All recordings for each user appear in the Recordings application. The recordings include calls that the user did not answer on the shared line.

When using shared lines, remember the following points:

- Cisco Quality Management does not support shared lines that call each other when both shared lines are assigned to the same agent (for example, Default Agent).
- Shared lines should be assigned to different agents or the agents should not call each other on those shared lines.
- Cisco Quality Management does not support Hot Desking with shared lines.
- Cisco Quality Management does not support placing a call on hold from one device on a shared line and then resuming the call from a different device on the same shared line.

## Supported Codecs

The following table displays the supported codecs by recording type for Unified CCX or Unified CCE. You will get a 1KB (8bytes) recording (raw file), if you do not use a supported codec.

Recording Type	Codecs			
	G.711	G.722	G.729	G.729A
Desktop Recording	x	x	x	x
Server Recording	x	x	x	x
Network Recording	x	x	x	x
Network Based Recording	x	x	x	x
MediaSense Recording	x	x	x	x

**NOTE:** Cisco Quality Management only supports G.729 and G.729A. It does not support G.729B.

Consult the Unified CM documentation for information on changing the codec of the IP phone.

## Extension Mobility

When configuring agents for extension mobility in a Network Recording, Network Based Recording, or Server Recording environment, you need to ensure the following:

- A user profile is associated with each agent
- Every phone an agent can log in to is associated with a Recording Cluster

When an agent logs in to a phone, their calls are recorded by the Recording Cluster assigned to their phone.

When configuring agents for Extension Mobility, consider the following:

- If the user is on a phone call when they log out of a device, the recording will stop.
- If you change the user profile (for example, the extension) in Unified CM, you must click the Synchronize Devices with Clusters button in the VoIP Devices window for the change to take effect.
- If you change the user profile in Unified CM and synchronize the databases in Quality Management Administrator, current calls on that device might be stopped and restarted.

## Software VPN Support

In a Unified CCX environment, Cisco Quality Management supports Cisco Systems VPN Client version 5.0 or later in a Server Recording, Network Recording, or Network Based Recording configuration.

## Configuring Cisco Unified CM for Live Audio Monitoring

Live Audio Monitoring uses the Unified CM's Silent Call Monitoring feature to silently monitor calls. This feature is explained fully in the Cisco documentation. However certain important characteristics of this feature will be repeated here for clarity and to ensure successful configuration, installation and usage.

Remember the following points when configuring phones to support the Live Audio Monitoring application with Network Recording, Network Based Recording, or Server Recording.

- Live Audio Monitoring only works on phones or softphones that include a Built-in Bridge (BIB).
- All phones used for live audio monitoring must be set up for Network Recording or Network Based Recording in both Unified CM Administration and Quality Management Administrator.
- Cisco Quality Management only supports Live Audio Monitoring within a single Unified CM



cluster.

**Example:** If a supervisor in cluster A tries to monitor an agent in cluster A, Live Voice Recording is supported. If a supervisor in cluster A tries to monitor an agent in cluster B, Live Voice Recording is not supported

- Phones used to monitor users do not need to be configured for Network Recording or Network Based Recording. The extension a supervisor or manager enters in the My Extension field in the Live Audio Monitoring application must be added to Unified CM application user group that was configured for Call Monitoring (that is, the Java Telephony API (JTAPI) user) and have a calling search space for the extension that includes the user's line or device partition to allow monitoring the agent.
- Assign the Standard CTI Allow Call Monitoring group to the JTAPI user in Cisco Unified CM. Live Audio Monitoring requires the permissions provided by this group.
- Live Audio Monitoring support for Secure calls and multiple codecs is defined by Unified CM. It is not enabled or restricted by Live Voice Recording.
- If a supervisor or manager is configured to be recorded using any recording method (for example, Desktop Recording, Server Recording, Network Recording, or Network Based Recording), any live audio monitoring sessions they conduct might be recorded. The calls will only be uploaded and displayed as calls in the Cisco Quality Management system if they match either an archive workflow or a quality management workflow. To avoid this behavior, an administrator can configure a second extension in Quality Management Administrator, and possibly Unified CM that is not configured to be recorded. Therefore, all calls on the first extension will be recorded, but live audio monitoring sessions conducted on the second extension will not be recorded.
- Unified CM's Silent Call Monitoring feature does not allow multiple supervisors or managers to monitor a single call. As a result, multiple supervisors or managers cannot monitor a single call using the Live Audio Monitoring application in Unified Workforce Optimization.



# System Architecture

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Cisco supports a single server configuration architecture. The system architecture, the servers, services, applications, APIs, and database that support the system architecture are described in the following topics.

## Server Types in a Single Server Architecture

Single server architecture consists of the Web Base server (see [Web Base server for Single Server Configuration](#)) and can include one or more of the following optional servers:

- Backup [Signaling Server](#)
- [Recording Server](#)—on-board
- Recording Cluster—consisting of one or more off-board Recording Servers
- [Monitor Server](#)—on-board or off-board

**Note:** The Monitor server is not available when using Cisco MediaSense Recording.

- [Recording and Monitor Server](#)—on-board or off-board

**Note:** The Monitor server and the Voice Record and Monitor server are not available when using Cisco MediaSense Recording.

- [External Recording Storage Server](#)
- [External SQL Server](#)

## Server Types in a Multiple Server Architecture

The multiple server architecture consists of the following required servers:

- [Site Upload Server](#)
- [Signaling Server](#)

A multiple server architecture can also include one or more of the following optional servers:

- Backup [Signaling Server](#)
- Recording Cluster

- [Monitor Server](#)—for agent monitoring

**Note:** The Monitor server is not available when using Cisco MediaSense Recording.

- [External Recording Server](#)
- MediaSense Subscription Server
- [External SQL Server](#)

For Cisco Unified CCX, the multiple server architecture supports 2-8 Cisco Unified CM clusters.

## Servers

This section describes the Cisco Quality Management servers.

### Web Base Server for Single Server Configuration

The following table displays the services that are associated with each bundle on a Web Base server in the single server architecture. Required service bundles must be installed on the Web Base server. Optional service bundles can be installed on the Web Base server or another designated server.

**Note:** Cisco recommends installing optional services bundles even if you are not using them so that you do not have to install them later to use these features.

Services Bundle	Services Description
<b>Required</b>	
Web Base Services	<ul style="list-style-type: none"> <li>■ Data API service</li> <li>■ Jetty service</li> </ul>
Operational Base Services	<ul style="list-style-type: none"> <li>■ Retrieval service</li> <li>■ File Observer service</li> <li>■ MANA service</li> <li>■ Sync service</li> </ul>

Services Bundle	Services Description
Signaling Services	Choose one of the following services bundles: <ul style="list-style-type: none"> <li>■ CTI service—for Desktop Recording, Network Recording, or Server Recording</li> <li>■ MediaSense Subscription service—for Cisco MediaSense Recording or Network Based Recording</li> <li>■ CUBE SIP CTI service—for Cisco CUBE Recording via SIP Recording or Network Based Recording</li> </ul>
Database Services	The services for Cisco Quality Management that manage the SQL database. <ul style="list-style-type: none"> <li>■ DB Cleaner service</li> <li>■ DB Proxy service</li> </ul>
Site Upload Services	The media file management services for this location. These services move recordings to the main storage location. <ul style="list-style-type: none"> <li>■ Jetty service</li> <li>■ Upload Controller</li> <li>■ Screen Playback Gateway service</li> </ul>
<b>Optional</b>	
Recording Services	Network Recording service—for Cisco CUBE Recording via SIP Recording, Cisco MediaSense Recording, Network Recording, Network Based Recording, or Server Recording  This service bundle can reside on the Web Base server or the Recording Server.
Encoding Services	Media Encoder service  This service bundle can reside on the Web Base server or the Media Encoding server.
Reconciliation Services	Reconciliation service
Monitoring Services	Monitor service—for Server Recording only  This service bundle can reside on the Web Base server or the Monitor server.

## Site Upload Server

The Site Upload server requires the Site Upload Server bundle. The Site Upload Server bundle provides the media file management services for the site and includes the following services:

- Jetty Service
- Upload Controller
- Screen Playback Gateway Service

See the following topics in the *Installation Guide* for more information:

- External Storage Server
- External Storage and Services

Use Site Upload servers when you want recordings to be located in the same area as the sites. The Recording server associated with a site will upload to the Site Upload server associated with the site. This has the following benefits:

- Reduces the WAN bandwidth required and keeps the recordings local in relation to the region where they were recorded
- Improves playback performance when recordings are located in the region where they are recorded

## External SQL Server

The external SQL server is an off-board server where Microsoft SQL Server is installed.

**Note:** This is an optional server for the single server architecture.

## Recording Server

The Recording Server requires the Recording Services bundle. The Recording Services bundle includes the Network Recording Service.

**Note:** This is an optional server for the single server architecture. The Recording Services bundle can be installed on the Web Base server or a separate Recording Server.

## Recording and Monitoring Server

**Note:** The Monitor server is not available for Cisco MediaSense Recording.

The Voice Record and Monitoring server requires the following bundles and services:

- Recording Services bundle—includes the Network Recording Service for Server Recording, Network Recording, or Network Based Recording
- Monitoring Services bundle—includes the Monitor Service for Server Recording, Network Recording, Network Based Recording

**Note:** This is an optional server for the single server architecture. The Recording Services and Monitoring Services bundles can be installed on the Web Base server or a separate Voice Record and Monitor server.

## Monitor Server

The Monitor server is for agent monitoring and requires the Monitoring Services bundle. The Monitor Services bundle includes the Monitor Service for Server Recording.

**Note:** This is an optional server for the single server architecture. The Monitor Services bundle can be installed on the Web Base server or a separate Monitor server.

## Gateway Recording Server

The Gateway Recording server includes Reconciliation Services bundle. The Reconciliation Services bundle enhances the metadata, and adds the agent name and endpoint extension. The Reconciliation Services bundle includes the Reconciliation service for Gateway Recording (that is, Cisco CUBE Recording via SIP Recording or Cisco MediaSense Recording).

## External Recording Storage Server

You can use an External Recording Storage server to store voice and screen recordings.

**Note:** This is an optional server for the single server architecture.

See the following topics in the *Installation Guide* for more information.

- External Storage User
- External Storage and Services

## Media Encoding Server

The Media Encoding server requires the Encoding Services bundle. The Media Encoding server provides the services that manage recording requests and the signaling for these requests to the least busy encoding service. The Encoding Services bundle includes the Media Encoder service. The Media Encoding server is associated with a site.

Desktop Experience must be enabled on the Media Encoding server.

## Signaling Server

For a single server architecture, you can install one of the signaling services in the Signaling Services bundle in the following locations:

- On the Web Base server
- On a backup Signaling server

Cisco Quality Management supports the following signaling servers:

Signaling Server	Description
CTI Server	<p>The CTI Server is a signaling server that requires the CTI Services bundle for use with a Unified CM cluster. The CTI Services bundle includes the CTI service for Desktop Recording, Network Recording, or Server Recording.</p> <p>In a Cisco environment, Cisco Quality Management requires one dedicated CTI server for each Unified CM cluster in a Unified CCX environment.</p> <div style="border: 1px solid #ccc; background-color: #e6f2ff; padding: 10px; margin-top: 10px;"> <p><b>Example:</b> If there are two Unified CM clusters, then there must be two Recording CTI servers.</p> </div>
CUBE SIP CTI Server	<p>The CUBE SIP CTI server is a signaling server that requires the CUBE SIP CTI Services bundle. The CUBE SIP CTI Services bundle includes the CUBE SIP CTI service for Cisco CUBE Recording via SIP Recording or Network Based Recording.</p>
Media Monitor Server	<p>The Media Monitor filters the media streams and forwards the media stream signaling and call signaling events (for example, begin and end call) to the signaling service. The signaling service determines which Recording server will receive the RTP from the Media Monitor.</p>
MediaSense Subscription Server	<p>The MediaSense Subscription server is a signaling server that requires the MediaSense Subscription Service bundle. The MediaSense Subscription Service bundle includes the MediaSense Subscription service for Cisco MediaSense Recording or Network Based Recording.</p>



## Scalability

### Notes on QM 11.5 QM All In One (QM + Recording + SQL) VM Configuration

Notes on 10.0, 10.5, 11.0, and 11.5 All in One (QM + Recording + SQL) OVA's. The QM All in One OVA provides a single server solution which includes the recording service for voice recording sessions via Server recording (SPAN), Network recording “Built in Bridge”, MediaSense recording, and Gateway (CUBE) recording including a SQL Server database instance.

#### 2 vCPU QM All in One OVA (Base + Record Server + SQL)

Cisco supports 25—maximum number of concurrent sessions (voice recording sessions for Server recording (SPAN), Network recording “Built in Bridge”, MediaSense recording, and Gateway (CUBE) recording).

Multiple vDisks are used as follows:

- **vDisk 1:** 32 GB operating system partition (Windows OS)
- **vDisk 2:** 40 GB application partition (Cisco WFO/SQL binaries); 5 GB for the SQL installation, excluding database files
- **vDisk 3:** 100 GB database partition (SQL database files (MDF, LDF, temp\_db)); 30 GB for the database file, 70 GB for the log file
- **vDisk 4:** temporary storage partition (see [Daily Storage Recording](#)) + optional permanent storage (see [Permanent Recording Storage](#))

**Note:** This OVA can be used as a separate standalone SQL Server if the customer chooses to have an off-board SQL instance separate from QM and Recording services. Use the SQL Recommendations table and Contact Metadata calculations to deploy the proper resourced OVA.

#### 4 vCPU QM All in One OVA (Base + Record Server + SQL)

Cisco supports 100—maximum number of concurrent sessions (voice recording sessions for Server recording (SPAN), Network recording “Built in Bridge”, MediaSense recording, and Gateway (CUBE) recording).

Multiple vDisks are used as follows:

- **vDisk 1:** 32 GB operating system partition (Windows OS)
- **vDisk 2:** 40 GB application partition (Cisco WFO/SQL binaries); 5 GB for the SQL installation, excluding database files
- **vDisk 3:** 100 GB database partition (SQL database files (MDF, LDF, temp\_db)); 30 GB for the database file, 70 GB for the log file

- **vDisk 4:** temporary storage partition (see [Daily Storage Recording](#)) + optional permanent storage (see [Permanent Recording Storage](#))

**Note:** This OVA can be used as a separate standalone SQL Server if the customer chooses to have an off-board SQL instance separate from QM and Recording services. Use the SQL Recommendations table and Contact Metadata calculations to deploy the proper resourced OVA.

## 6 vCPU QM All in One OVA (Base + Record Server + SQL)

Cisco supports 300—maximum number of concurrent sessions (voice recording sessions for Server recording (SPAN), Network recording “Built in Bridge”, MediaSense recording, and Gateway (CUBE) recording).

Multiple vDisks are used as follows:

- **vDisk 1:** 32 GB operating system partition (Windows OS)
- **vDisk 2:** 40 GB application partition (Cisco WFO/SQL binaries); 5 GB for the SQL installation, excluding database files
- **vDisk 3:** 100 GB database partition (SQL database files (MDF, LDF, temp\_db)); 30 GB for the database file, 70 GB for the log file
- **vDisk 4:** temporary storage partition (see [Daily Storage Recording](#)) + optional permanent storage (see [Permanent Recording Storage](#))

**Note:** This OVA can be used as a separate standalone SQL Server if the customer chooses to have an off-board SQL instance separate from QM and Recording services. Use the SQL Recommendations table and Contact Metadata calculations to deploy the proper resourced OVA.

## 8 vCPU QM All in One OVA (Base + Record Server + SQL)

Cisco supports 400—maximum number of concurrent recording sessions (voice recording sessions for Server recording [SPAN], Network recording Built in Bridge, MediaSense recording, and Gateway [CUBE] recording)

Multiple vDisks are used as follows:

- **vDisk 1:** 32 GB operating system partition (Windows OS)
- **vDisk 2:** 40 GB application partition (Cisco WFO/SQL binaries); 5 GB for the SQL installation, excluding database files
- **vDisk 3:** 100 GB database partition (SQL database files (MDF, LDF, temp\_db)); 30 GB for the database file, 70 GB for the log file

- **vDisk 4:** temporary storage partition (see [Daily Storage Recording](#)) + optional permanent storage (see [Permanent Recording Storage](#))

**Note:** This OVA can be used as a separate standalone SQL Server if the customer chooses to have an off-board SQL instance separate from QM and Recording services. Use the SQL Recommendations table and Contact Metadata calculations to deploy the proper resourced OVA.

## Notes on 11.5 Expansion Recording Server OVA's

Additional Recording Servers can be added to an existing “QM All in one OVA” to increase recording capacity.

### 2 vCPU Expansion Recording Server OVA

Cisco supports 150—maximum number of concurrent recording sessions (voice recording sessions for Server recording (SPAN), Network recording “Built in Bridge”, MediaSense recording, and Gateway (CUBE) recording).

Multiple vDisks are used as follows:

- **vDisk 1:** 32 GB operating system partition (Windows OS)
- **vDisk 2:** 40 GB application partition (Cisco WFO)
- **vDisk 3:** temporary storage partition (see [Daily Recording Storage](#))

### 4 vCPU Expansion Recording Server OVA

Cisco supports 125—maximum number of concurrent recording sessions (voice recording sessions for Server recording (SPAN), Network recording “Built in Bridge”, MediaSense recording, and Gateway (CUBE) recording).

Multiple vDisks are used as follows:

- **vDisk 1:** 32 GB operating system partition (Windows OS)
- **vDisk 2:** 40 GB application partition (Cisco WFO)
- **vDisk 3:** temporary storage partition (see [Daily Recording Storage](#))

### 6 vCPU Expansion Recording Server VM Configuration

Cisco supports 300—maximum number of concurrent sessions (voice recording sessions for Server recording (SPAN), Network recording “Built in Bridge”, MediaSense recording, and Gateway (CUBE) recording).

Multiple vDisks are used as follows:

- **vDisk 1:** 32 GB operating system partition (Windows OS)
- **vDisk 2:** 40 GB application partition (Cisco WFO)

- **vDisk 3:** temporary storage partition (see [Daily Recording Storage](#))

## 8 vCPU Expansion Recording Server OVA

Cisco supports 600—maximum number of concurrent recording sessions (voice recording sessions for Server recording (SPAN), Network recording “Built in Bridge”, MediaSense recording, and Gateway (CUBE) recording).

Multiple vDisks are used as follows:

- **vDisk 1:** 32 GB operating system partition (Windows OS)
- **vDisk 2:** 40 GB application partition (Cisco WFO)
- **vDisk 3:** temporary storage partition (see [Daily Recording Storage](#))

## IOPS and Storage System Performance Requirements

The minimum IOPS for QM 11.5 and later is 143.

### Daily Recording Storage

You need to determine your hard disk space requirements for the daily recording storage. Daily recording storage is where the recording service will store recorded files temporarily until they are uploaded to permanent storage. The formula used to determine hard disk space requirements, in GB, for a single recording server configuration is as follows:

The daily recording storage requirements are as follows:

- For SPX—the value is .5 GB for voice recording only or 1 GB for voice and screen recording
- For 8-bit WAV—the value is 2 GB for voice recording only or 2.5 GB for voice and screen recording
- For 16-bit WAV—the value is 6 GB for voice recording only or 6.5 GB for voice and screen recording

Daily Recording Storage Formula:

$$\text{Daily Storage} = C \times D$$

where:

- C = GB
- D = Number of recording users

**Example:** (.5 GB x 100 Recording users) = 50 GB Daily Storage

### Permanent Recording Storage

To calculate the storage that a contact center will need, you need to collect the following data:

- Number of agents who will be recorded
- Average length of calls that are recorded
- Number of calls that are recorded per agent per day
- Number of work days per agent per month
- Number of months that recordings will be kept

The number of minutes that will be recorded every day is the product of three numbers: the number of agents being recorded, the average call length, and the average number of calls that are recorded for each agent per day.

To estimate the amount of disk storage required for your system, use the following formulas:

Daily recorded minutes		$(\# \text{ of Agents}) \times (\text{Avg. call length}) \times (\# \text{ of Calls}) = \text{Daily Recorded Minutes}$
Total recorded minutes to store		$(\text{Daily Recorded Minutes}) \times (\text{Days per Month}) \times (\text{Months to store}) = \text{Stored}$
Voice recording storage (MB)	SPX	$\text{Stored} \times 0.12 \text{ MB/minute} = \text{Voice}$
	8-bit WAV	$\text{Stored} \times 0.48 \text{ MB/Minute} = \text{Voice}$
	16-bit WAV	$\text{Stored} \times 1.44 \text{ MB/Minute} = \text{Voice}$
Screen recording storage (MB)		$\text{Stored} \times 1.20 \text{ MB/minute} = \text{Screen}$
<div style="background-color: #e1f5fe; padding: 10px; border: 1px solid #ccc;"> <p><b>Note:</b> The storage requirements for screen recordings depend on three factors: screen activity, monitor resolution, and the number of monitors being recorded. The value shown here is based on low to moderate screen activity, 768 x 1024 resolution, and a single monitor. This rate may increase by 200-400% when recording dynamic, graphical, or media-intensive applications.</p> </div>		

## Desktop Applications

You can install the Cisco Quality Management desktop applications from web pages that reside on the Cisco Quality Management Web Base server. See the *Installation Guide* for instructions on installing

the desktop applications.

The following table lists the supported desktop applications.

Desktop Application Name	Description
Quality Management Administrator	<p>Use Quality Management Administrator to assign user roles, set up groups, create evaluation forms, manage evaluation forms, set up workflows for recording customer contacts, set up recording archiving, and maintain the Cisco Quality Management system.</p> <p>By default, Cisco Quality Management installs Quality Management Administrator on the Web Base server. Using Quality Management Administrator on the Web Base server ensures that all features under System Configuration are enabled.</p> <p>You can also install Quality Management Administrator on the desktop assigned to the Quality Management Administrator. When Quality Management Administrator is installed on a desktop, the features under the System Configuration node that allow you to configure information on the Web Base server are disabled. To modify these features, use either the Quality Management Administrator or System Configuration Setup (PostInstall.exe) on the Web Base server.</p>

Desktop Application Name	Description
The Desktop Recording service	<p>The Desktop Recording service is responsible for:</p> <ul style="list-style-type: none"> <li>■ Screen recording and upload for Gateway Recording, Network Recording, Network Based Recording, Server Recording</li> <li>■ Voice recording, screen recording, and upload for Desktop Recording (Endpoint)</li> <li>■ Live Screen Monitoring for all recording types.</li> </ul> <p>The Desktop Recording service must be installed on:</p> <ul style="list-style-type: none"> <li>■ All Endpoint voice recording desktops and screen recording desktops in a Cisco environment</li> </ul> <p>If a user is configured for Network Recording, Network Based Recording, or Server Recording and the agent's desktop is daisy-chained to a phone, voice recording occurs on the server.</p> <p>See the description of Desktop Recording in <a href="#">Supported IP Phones in a Cisco Environment</a> for more information.</p>

## Server Applications

You can install the Cisco Quality Management server applications from a web page that resides on the Web Base server. See "Installing Server Applications" in the *Installation Guide* for instructions.

The following table lists the supported server applications.

Server Application Name	Description
Recording Thin Client	<p>The Recording Thin Client records screens from Citrix client sessions.</p> <p>You must install the Recording Thin Client on a Citrix server.</p>

## Web Applications

You access the Cisco Quality Management web applications from the Unified Workforce Optimization user interface using a browser. Use Unified Workforce Optimization to perform the following tasks:

- View the contact center's performance statistics for the last twelve months by agent, team, and group
- Search stored archives for specific contact
- Play back recordings
- Evaluate contact for quality management
- Monitor active calls
- Monitor the recording status of active calls
- Generate evaluation reports and system reports

See "Browser" in the *Installation Guide* for browser requirements.

## Services

You can install services from the Cisco Quality Management setup executable. See [System Architecture](#) for information on where these services reside.

**Note:** To maximize system performance and increase data storage capacity, do not install other applications on the servers that host the services for Cisco Quality Management.

The following table lists the available services.



Service Name	Description
Monitoring and Recording CTI Service	<p>The Monitoring and Recording Computer Telephony Integration (CTI) service (Recording CTI service) creates a monitoring session using the Cisco Unified Communications Manager (Unified CM) Java Telephony Application Programmer Interface (JTAPI) to get call control events and status updates from monitored devices.</p> <p>The Recording CTI service sends events to the Network Recording service when there is a change in the status of monitored phones. The recording CTI service also sends screen recording start/stop signals to the recording clients.</p> <p>Install this service if you plan to use Desktop Recording, Network Recording, or Server Recording (SPAN).</p> <p>When you install the CTI service, remember that the CTI service cannot be coresident with the CUBE SIP CTI.</p> <p>See <a href="#">Signaling Service</a> for more information.</p>
Monitoring and Recording CUBE SIP CTI Service	<p>The Monitoring and Recording Cisco Unified Border Element (CUBE) Session Initiation Protocol (SIP) CTI service (CUBE SIP CTI service) creates a monitoring session by responding to SIP INVITEs from the CUBE. The CUBE SIP CTI service sends events to the Network Recording service when there is a change in the status of monitored phones.</p> <p>Install this service if you plan to use Cisco CUBE Recording via SIP Recording or Network Based Recording. When you install the CUBE SIP CTI service, remember the following points:</p> <ul style="list-style-type: none"> <li>■ The CUBE SIP CTI service is required for CUBE Recording or Network Based Recording.</li> </ul> <p>See <a href="#">Signaling Service</a> for more information.</p>

Service Name	Description
Monitoring and Recording Data API Service	<p>The Monitoring and Recording Data API (Data API) service is the interface between the Jetty webserver and the Cisco Quality Management database.</p> <p>The Data API service evaluates a quality workflow based on current End of Day (EOD) time. If the EOD time changes, the Data API service is notified immediately and all calls will be processed using the new EOD time. See the <i>Administrator Guide</i> for more information on EOD.</p> <p>The Data API service will process quality workflow in 24-hour batches based on current EOD. (At most, it will process 10 days worth of unprocessed contacts per session.)</p> <p>The Data API service receives connection information when an agent logs into Recording and Quality Management. The information is used by the live screen monitoring feature.</p>
Monitoring and Recording DB Cleaner Service	<p>The Monitoring and Recording DB Cleaner (DB Cleaner) service purges the following data on a daily basis:</p> <ul style="list-style-type: none"> <li>■ Records from the Cisco Quality Management database</li> <li>■ Media files from the Site Upload server</li> </ul>
Monitoring and Recording DB Proxy Service	<p>In a Cisco Quality Management deployment, the Monitoring and Recording DB Proxy (DB Proxy) service is the point of connection between the Upload Controller and the Cisco Quality Management database.</p> <p>The DB Proxy service tells the Upload Controller when to upload or delete a recording. If not enough information is known about a recording to indicate that it should be updated or deleted, the DB Proxy service tells the Upload Controller to ask again at EOD.</p>
Monitoring and Recording File Observer Service	<p>The Monitoring and Recording File Observer (File Observer) service watches a specific file location for post-call surveys. the default location is C:\Program Files\Common Files\QM\surveys. When a new survey file appears in this folder, the File Observer service imports the file into Recording and Quality Management.</p>
Monitoring and Recording Jetty Service	<p>The Monitoring and Recording Jetty (Jetty) service webserver hosts the Cisco Quality Management Reports webapp, C1Surrogate webapp, Media webapp, Server API engine, and Licensing webapp.</p>

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Service Name	Description
Monitoring and Recording MANA Service	<p>The Monitoring and Recording Monitoring and Notification (MANA) service polls the Cisco Quality Management system for problems. When there are problems, the MANA service sends alerts to the administrators through the event viewer, email, or SNMP. You can select the problems that trigger the notification in Quality Management Administrator.</p> <p>See "Monitoring and Notification" in the <i>Installation Guide</i> for more information.</p>

Service Name	Description
Monitoring and Recording Media Encoder Service	<p>The Monitoring and Recording Media Encoder (Media Encoder) service manages:</p> <ul style="list-style-type: none"><li>■ The upload of recordings and call metadata from the recording clients to permanent storage.</li><li>■ The deletion of recordings and call metadata from permanent storage.</li><li>■ The status of recordings.</li><li>■ The load balancing of compliance requests to the least busy encoding service. The Media Encoder service gets a copy of the file from permanent storage, decrypts the recording, edits out the compliance events from the recording, encrypts the recording, and then updates the existing file on permanent storage.</li><li>■ The load balancing of playback requests to the least busy encoding service. The Media Encoder server gets a copy of the voice and screen files from permanent storage, combines them into a single media file and copies the recording to a shared temporary location where the user can play back the recording in the Media Player.</li><li>■ The load balancing of the energy bar request to the least busy encoding service. The energy bar data is specific to the audio recording and is displayed in the Media Player.</li><li>■ The load balancing of an export request to the least busy encoding service. The Media Encoder service gets a copy of the voice or screen file from permanent storage, decrypts the recording, encodes the recording to the request file format, and then copies it to a shared temporary location. An alert is sent in Unified Workforce Optimization when the exported file is ready for download.</li></ul> <p>You must install the Media Encoder service on at least one Media Encoder server. You can choose to install the Media Encoder service on multiple Media Encoder servers.</p>

Service Name	Description
Monitoring and Recording MediaSense Subscription Service	<p>The Monitoring and Recording MediaSense Subscription (MediaSense Subscription) service registers Cisco MediaSense events. When a call is recorded on the Cisco MediaSense cluster for a registered device, this service receives an event with information related to the call recording and sends it to the Network Recording service that is associated with the VoIP device that was recorded. The Network Recording service downloads the raw data files, stores them in the Recordings folder, and writes the data associated with the call to the database.</p> <p>Install this service if you plan to use Cisco MediaSense Recording or Network Based Recording.</p> <p>See <a href="#">Signaling Service</a> for more information.</p>
Monitoring and Recording Monitor Service	<p>The Monitoring and Recording Monitor (Monitor) service works in conjunction with the Network Recording service for Server Recording. The Monitor service filters the packets coming from a Switched Port Analyzer (SPAN) session and forwards the packets to the Network Recording service for recording.</p>
Monitoring and Recording Network Recording Service	<p>The Monitoring and Recording Network Recording (Network Recording) service records voice for agents who are configured for Server Recording, Network Recording, Network Based Recording, or Gateway Recording.</p>
Monitoring and Recording Reconciliation Service	<p>The Monitoring and Recording Reconciliation (Reconciliation) service gathers all information for a call recording received through the Session Border Controller (SBC). It then stores the contact information for the call in the Cisco Quality Management database.</p>
Monitoring and Recording Retrieval Service	<p>The Monitoring and Recording Retrieval (Retrieval) services obtains adherence results from WFM for the gamification feature.</p>
Monitoring and Recording Sync Service	<p>The Monitoring and Recording Sync (Sync) service synchronizes the following users every 10 minutes:</p> <ul style="list-style-type: none"> <li>■ Agents and supervisors from Unified CCX</li> </ul>
Monitoring and Recording Upload Controller	<p>The Monitoring and Recording Upload Controller (Upload Controller) service manages the upload of recordings and call metadata from the recording clients.</p>

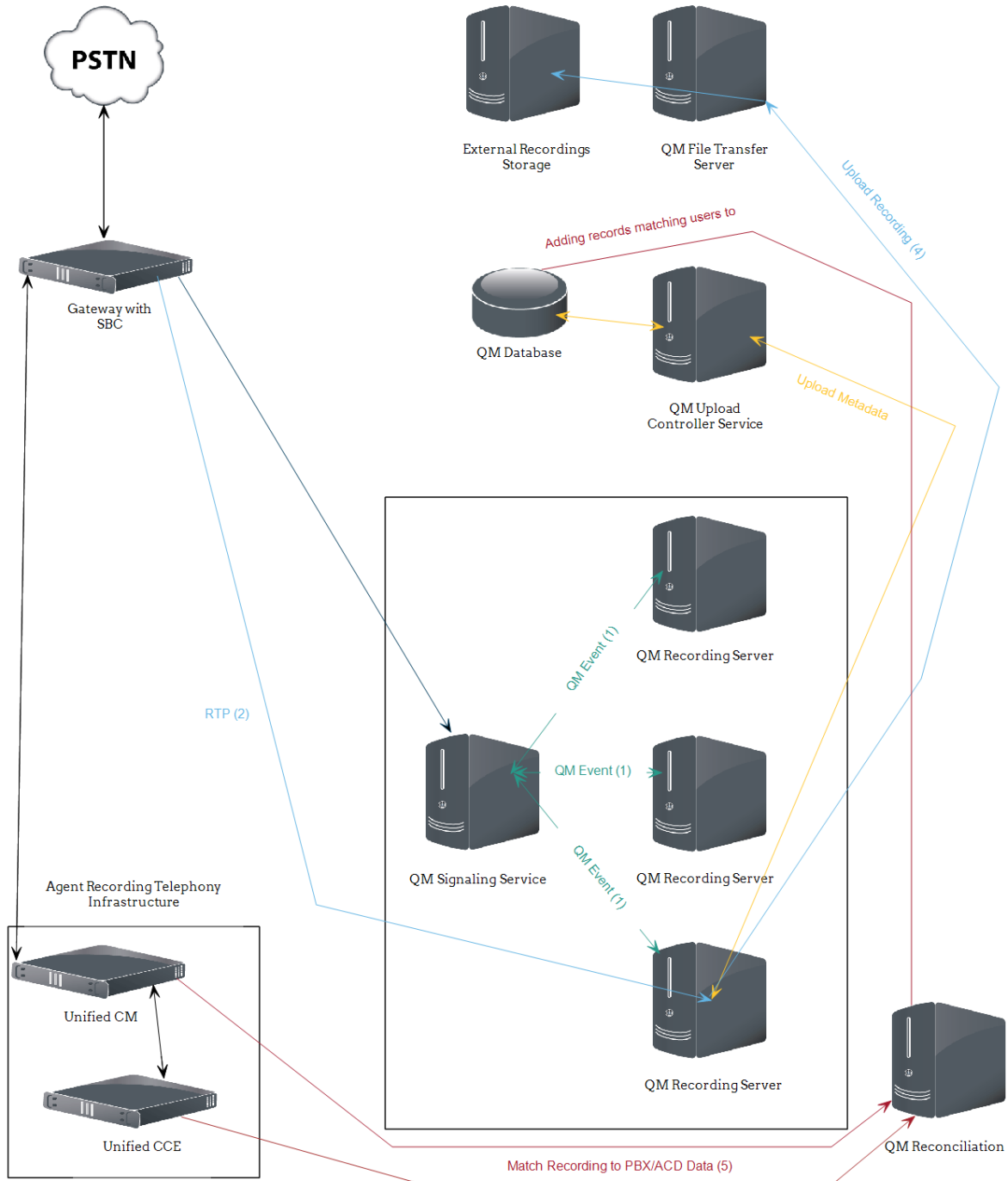
## Reconciliation

Reconciliation is the process of gathering call-related data from one or more external sources and cross-referencing it with the sparse data that the call provided with the call recording.

**Example:** ANI, DNIS, extension, or some type of gateway call identifier

When a call recording is reconciled, the contact record is stored in the Cisco Quality Management database. Remember that a call recording might involve several agents. The time a specific agent was on a call is included in the database. You can use the search feature in the Recordings application to search for the agent associated with a specific call recording and then play back or evaluate the portion of the call recording that is associated with that agent. See "Search Recordings" in the *Recording and Quality Management User Guide* for more information.

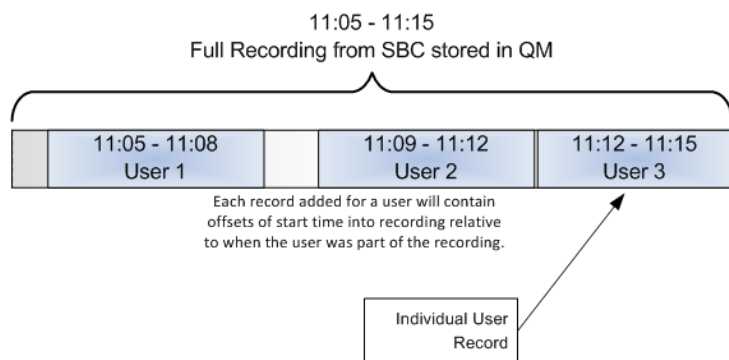
Contact reconciliation occurs after the call data has been uploaded and before the recording is uploaded to permanent storage. Reconciliation will use the call data that was uploaded to the system database to determine which users, if any, participated in the call recording.



Each call recording will contain a unique ID that originated at the SBC. The reconciliation process uses that unique ID to determine which users participated in the call during the time it was recorded. The reconciliation process will then update the system database with the new user information and any metadata associated with the call based on information gathered from the PBX/ACD.

After the reconciliation process has run, the original call will be available for playback, but not for quality management or quality scoring. Additional records for that call will be available that include the person(s) associated with the call and when the time they were on the call.

**Example:** If a call recording runs from 11:05 to 11:15, that call will be available for playback right after the recording ends. If User 1 is on the call from 11:05 to 11:08, User 2 from 11:09 to 11:12 and User 3 from 11:12 to 11:15, there will be four records available for playback after reconciliation has run. The records include the original call and records for users 1, 2, and 3. The records for users 1, 2, and 3 contain the data for when those users were on the call and will be available for quality scoring.



## Signaling Service

Cisco Quality Management provides the following signaling services service:

- Monitoring and Recording CTI Service
- Monitoring and Recording CUBE SIP CTI Service
- Monitoring and Recording MediaSense Subscription Service

Use the signaling service that is best suited for your environment.

When a call event goes through the SBC, the signaling service receives an event with information related to the call and sends it to the Network Recording service that is associated with a Recording Server in a Recording Cluster. The signaling service also performs signaling on call events to the Recording Servers that are registered with the signaling.

The Recording Server either records the Real-time Transport Protocol (RTP) or retrieves the call recording made by another recording system (for example, MediaSense). The Network Recording service downloads the raw data files, stores them in the Recordings folder, and writes the data associated with the call to the database.

You can also use the signaling service to improve resiliency.



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## Mixed Mode Licensing

You need to assign licenses to the following users:

- Agents and knowledge workers you need to record
- Users who need to access the web applications

You can assign the same license to all users or you can assign a mixture of licenses to users.

The license type determines what Cisco Quality Management records.

**Example:** If agents X and Y have an Advanced Quality Management (AQM) license, the application can record their screens.

SolutionsPlus is a set of licenses that support the MediaSense capture method for recordings.

SolutionsPlus only uses the MediaSense Subscription service and does not use the Monitor service.

**Important:** If a user licensed for SolutionsPlus is configured for a different recording capture method, the Recording Cluster will ignore the configuration and the user will not be recorded.

The licenses are as follows:

- The Compliance Recording (CRS+) license—allows only audio recording and archive search and playback. Status and archive reports are available to supervisors and managers only.
- The Advanced Quality Management (AQMS+) license—supports both audio and screen recordings, as follows:
  - Audio-only recording for archival purposes
  - Screen and audio recordings for quality management purposes

## Upgrading Your SolutionsPlus Licenses

If you need more recording capture methods, you can purchase Cisco licenses. A Cisco license includes the following recording capture methods:

- Desktop Recording
- Server Recording
- Network Recording
- Network Based Recording

- Cisco CUBE Recording via SIP Recording
- MediaSense Recording

To add more recording capture methods, you need to:

- Purchase a Cisco (CR or AQM) license
- Add more servers, as required, to meet capacity and configuration requirements
- Install the appropriate subscription service and the Monitor service, if they were not previously installed
- Switch users to the Cisco license

## Cisco Licenses

Cisco provides a set of licenses that use the Cisco capture method for recordings. The licenses are as follows:

- The Compliance Recording (CR) license—allows only audio recording and archive search and playback. Status and archive reports are available to supervisors and managers only.
- The Advanced Quality Management (AQM) license—supports both audio and screen recordings, as follows:
  - Audio-only recording for archival purposes
  - Screen and audio recordings for quality management purposes

## License and Features

The following table shows the Recording and Quality Management features available by license for Cisco Unified CCX.

Feature	Cisco Licenses		SolutionsPlus Licenses	
	CR	AQM	CRS+	AQMS+
100% voice recording and archiving	x	x	x	x
Live audio monitoring	x	x	x	x
Desktop Recording, Cisco CUBE Recording via SIP Recording, Server Recording, Network Recording, and Network Based Recording	x	x	--	--
Cisco MediaSense Recording	x	x	x	x

Feature	Cisco Licenses		SolutionsPlus Licenses	
	CR	AQM	CRS+	AQMS+
Search utility	x	x	x	x
On-demand recording	x	x	x	x
Recording with or without a PC	x	x	x	x
Monitoring and Notification (MANA) administration	x	x	x	x
Quality evaluations	--	x	--	x
Screen recording	--	x	--	x

## Upgrading Licensing

If you need to upgrade licensing, contact your Cisco sales representative.

## APIs

Cisco provides the following APIs:

- The Server API allows users to search, export, edit, and delete Cisco Quality Management call data from uploaded contact recordings. The Server API is a REST-like API. The Server API uses Secure Sockets Layer (SSL), so uses HTTPS to issue requests. You format the request and response bodies using JavaScript Object Notation (JSON).
- The Recording Controls API provides a means for users to create an external application that interfaces with the Cisco Quality Management system and allows agents to perform the following actions:
  - Tag calls for recording and retention
  - Pause a recording
  - Resume a recording
  - Restart a recording
  - Delete calls marked for recording
  - Attach user-defined metadata to calls
  - Start and stop call segments

- Log on to phones and log out of phones—only Agent Recording supports this feature. This feature is not supported for Gateway Recording.
- Start and stop screen only recording
- The Recording Verification API allows you to locate calls and verify their recording status.
- The Post-Call Survey API provides a means of importing customer surveys into Recording and Quality Management.
- The Contact Basic Search API provides a means of searching details regarding an in progress or most recently completed call.
- The Import API allows you to create Ccr, Media, and Media File table entries from POST requests submitted by a custom written customer application or other HTTP POST methods.

For more information, see the *Developer, API, and Database Schema Guide*.

## Cisco Recording Export

Cisco Recording Export (CRX) is a software utility that allows you to export the audio portion of contact recordings and their associated metadata in bulk for further processing (such as speech analytics) or storage.

For more information, see "Recording Export Utility" in the *Installation Guide*.

## Database

See the *Developer, API, and Database Schema Guide* for a complete description of how data is organized in the Cisco Quality Management database.

**Important:** Changing the database schema is not supported. Modify the database schema at your own risk. If you modify the database schema, use proper backup procedures.

# Capture and Recording Methods (In-depth View)

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Cisco supports the following capture/recording methods:

- Agent Recording—all calls go through a PBX or ACD. Call-control signaling tells Cisco Quality Management when to start recording and which agent to assign the audio to. Agent Recording supports the following recording methods:

- Desktop Recording—reliable and scalable in IP-based environments. All audio traffic goes to the agent's phone regardless of the path it took through the network. All calls are captured from the agent's perspective. Desktop recording is especially powerful when call center agents are dispersed in various locations because you do not need servers at every location.
- Network Recording—the preferred option for live audio monitoring. Use Cisco Unified CM to control the phone's Built in Bridge to fork a call stream for recording or live audio monitoring. All audio traffic goes to the agent's phone regardless of the path it took through the network. All calls are captured from the agent's perspective.
- Network Based Recording—Use Cisco Unified CM to control the phone's Built in Bridge to fork a call stream for recording or live audio monitoring. All audio traffic goes from the IP phone or from a gateway that is connected to Cisco Unified Communications Manager over a SIP trunk. You can use Network Based Recording with Cisco CUBE Recording or Cisco MediaSense Recording.
- Server Recording (SPAN)—the preferred option when operating in a thin client environment (for example, Citrix or Windows Terminal Services) in Unified CCX. All calls go through a switch to reach the agent's phone. All calls are captured from the switch.

See [Agent Recording](#) for additional information.

- Gateway Recording—all calls go through a gateway or Session Border Controller (SBC). All calls are captured from the gateway or SBC. Gateway Recording supports the following recording method:
  - Cisco CUBE Recording via SIP Recording—The preferred method for CUBE Recording.

See [Gateway Recording](#) for additional information.

- Cisco supports MediaSense Recording—the preferred method for Cisco MediaSense. Cisco MediaSense is a robust scalable clustering architecture. All calls go through and are captured by Cisco MediaSense.

Choose the best architecture for your environment and business needs.

## Agent Recording

Agent Recording is the use of call-control messages to record calls based on the agent's point of view. The calls are handled by a PBX or ACD.

Cisco supports all of these recording methods along with call-control signaling that tells Cisco Quality Management when to start recording and which agent to assign the audio to. The call-control signaling uses JTAPI and SIP messages to determine which agent a call belongs to. Cisco Quality Management saves the audio and updates the database with information about the call and associates the call with an agent or user.

The disadvantage of Agent Recording is that even when everything is installed and working properly, calls might not be recorded because of the multitude of configuration and administration options.

For Agent Recording, remember the following points when configuring a load-balanced voice recording cluster:

- Device extensions are assigned to a recording cluster, not an individual Recording server.
- The signaling service is responsible for providing recording resiliency among all available Recording servers in a recording cluster.
- Voice clusters are assigned to a Site Upload server.
- The Recording server only handles voice recording. It does not handle screen recording.
- In a Compliance environment, users are only configured to access recordings.

## Desktop Recording (Endpoint)

This section describes the requirements for the Desktop Recording (Endpoint).

When you configure your site for Desktop Recording, consider the following:

- The Desktop Recording service does not support SRTP.
- The Desktop Recording service does not support devices with a security profile set to secure in Cisco Unified CM. You must set the security profile to non-secure to record calls using the Desktop Recording service.

In a Cisco environment, the following deployment scenarios are not supported by the Desktop Recording service.

- Thin clients (Citrix or Microsoft Terminal Services)
- Phones without PCs

The Desktop Recording service supports hot desking (hoteling) provided the user logs into the computer using their own login ID. Hot desking is one desk shared between several people who use the desk at different times. This work surface can be an actual desk or just a terminal link. Companies where not all the employees are in the office at the same time or not in the office for very long at all regularly use hot desking.

Extension Mobility allows the user to log in to the phone so that phone takes on the extensions configured for that user. Support for Extension Mobility in a Desktop Recording environment requires the user to log in to a computer with the user's correct Windows NT user name and password. This method assures the correct device is associated with the correct user because the Desktop Recording service can see the phone that is attached to the computer when the user logs in to the computer.

Recordings can occupy a great deal of hard disk drive space on an agent's computer. To protect the agent's computer from running out of the free space required for normal operations and to prevent crashes, the Desktop Recording service halts recording when the available hard disk drive space falls below the following minimum capacity:

- Voice recordings—100 MB
- Screen recordings—250 MB

After the space is freed up, recordings will resume.

**Note:** After the recordings are uploaded from the agent's PC to the storage server, the recordings are automatically removed from the PC.

Desktop Recording requires that the network interface card (NIC) and agent desktop support Promiscuous Mode.

The Desktop Recording service does not function with some NICs. The Intel PRO/100 and PRO/1000 NIC series are unable to detect both voice packets and data packets in a multiple VLAN environment, which prevents the Desktop Recording service from functioning properly. These NICs do not fully support NDIS Promiscuous Mode settings.

A workaround solution is available from the Intel Technical Support website (Solution ID: CS-005897). Another solution is to use a NIC that is fully NDIS-compliant.

The workaround described in CS-005897 might not work for some newer Intel PRO/100 and Intel PRO/1000 cards and drivers.

If the workaround does not solve the problem, the VLAN ID of the IP phone to which the agent computer is directly connected must be added to the VLANs tab of the Intel NIC's Network Connection Properties dialog box.

The IP phone's VLAN ID can be obtained from the phone's Network Configuration screen (press Settings and then choose Network Configuration). For more information, see the documentation specific to your version of the Unified CM and IP phone model.

The following is a partial list of supported NICs:

- D-Link Express EtherNetwork Workstation Ethernet LAN Connectivity DFE-530TX+
- D-Link Fast Ethernet 10/100Mb Adapter DFE-550TX
- SMC Networks Fast Ethernet PCI Card SMC-1244TX
- SMC Networks EZ Card 10/100 Mbps Fast Ethernet PCI Card SMC-1255TX
- ReadyLINK Express 10/100 Fast Ethernet Adapter RE100TX

The Desktop Recording service supports the following phone configurations:

- Hard IP phone and agent computer daisy-chained to the network (see the following figure). The only time you should daisy-chain your phones is when you intend to use Endpoint Recording or Network Recording, or Network Based Recording.

**Note:** Multiple daisy-chained phones are not supported.

- Cisco IP Communicator soft IP phone on the agent's computer, connected to the network (see the following figure). A hard IP phone cannot be on the same network connection as the agent PC. Cisco IP Communicator must be in the computer's startup menu so that it can be detected by the Desktop Recording service.

Information about configuring phones for server recording can be found in the document *Configuring and Troubleshooting VoIP Monitoring*. This document is available on the Cisco website ([www.cisco.com](http://www.cisco.com)).

Cisco Quality Management supports Desktop Recording (Endpoint) for remote agents with an attached IP phone or IP soft phone for both voice and screen recording using a Cisco 831 router or the Cisco 871 router.

Cisco Quality Management supports the following VPN software:

- Cisco IP Communicator behind a Cisco Systems VPN Client version 5.0 or later
- Cisco's AnyConnect VPN version 2.5(x) or later
- Check Point VPN

When considering the pros and cons of using Desktop Recording, note the following:



**Pros:**

The Desktop Recording service can be installed on any agent desktop and is easy to scale.

**Cons:**

Since the Desktop Recording service is installed on every agent desktop, each desktop has to be touched when you upgrade to the latest version of Cisco Quality Management.

## Network Recording

Network Recording uses the Cisco Unified CM Recording functionality to capture voice for recording and the Built-in Bridge (BIB) functionality of capable IP phones to send voice streams from the device being recorded to the Network Recording service. An advantage to the Network Recording approach is that it does not require you to configure SPAN ports for capturing voice traffic.

For more information on this subject, see the “Monitoring and Recording” section of the *Unified CM Silent Monitoring/Recording Supported Device Matrix* available at:

<https://developer.cisco.com/site/uc-manager-sip/faq/supported/index.gsp>

When configuring Unified CM Administration for Network Recording, consider the following:

- To enable Network Recording for Cisco Quality Management, you must set up Unified CM for Automatic Recording on each line you want to record.
- If you select On Demand for each line you want to record, a third-party application is required to initiate the recording. Cisco Quality Management will only capture the voice and screen from the point where a request to record is issued. Cisco Quality Management does not initiate the recording. Cisco Quality Management does not capture the entire conversation.

When setting up your phones for Network Recording, consider the following:

- Not all IP phones support Network Recording. Phones supported for Network Monitoring and Recording can be found in the *Unified CM Silent Monitoring/Recording Supported Device Matrix* available at:  
<https://developer.cisco.com/site/uc-manager-sip/faq/supported/index.gsp>
- A device cannot be configured for Server Recording and Network Recording at the same time. You can, however, change the configuration from Server Recording to Network Recording. Or change a configuration from Network Recording to Server Recording.
- Network Recording does not act as a backup to Desktop Recording. If a device is

configured in Quality Management Administrator for Network Recording, then Network Recording will be the only recording approach used for that device.

For more information on configuring your system for Network Recording, see the *Administrator Guide*.

Network Recording supports the recording of Secure Real-time Transport Protocol (SRTP) calls with Cisco Unified. See the Cisco Unified CM documentation for more information on configuring SRTP for Cisco Quality Management. This includes the configuration of a secure SIP trunk and certificate management. Use the SIP Trunk Certificate tool in System Configuration Setup to configure the certificate required by Cisco Unified CM to establish a trusted relationship for security key exchange. See “SIP Trunk Certificate” in the *Installation Guide* for more information.

The Recordings folder for Network Recording is located on same drive where you installed the services for Cisco Quality Management.

Cisco recommends using a Redundant Array of Independent Disks (RAID) for storage reliability.

Cisco recommends disabling the CTIOS Agent Greeting if you are using Built-in Bridge (BIB). Enabling the CTIOS Agent Greeting with BIB might result in unexpected behavior. For example:

- The CTIOS Agent Greeting was recorded but the recordings are out of sync and garbled.
- The CTIOS Agent Greeting is not recorded.

Cisco Quality Management supports remote agents with one of the following VPN hardware options:

- Network Recording or Network Based Recording and a Monitoring capable IP phone
- Network Recording or Network Based Recording and a Monitoring capable IP soft phone for both voice and screen recording using a router

## Network Based Recording

Network Based Recording uses the Cisco Unified CM Recording functionality to capture voice for recording from either an IP phone (BIB) or gateway. Network Based Recording supports Cisco CUBE Recording via SIP and Cisco MediaSense.

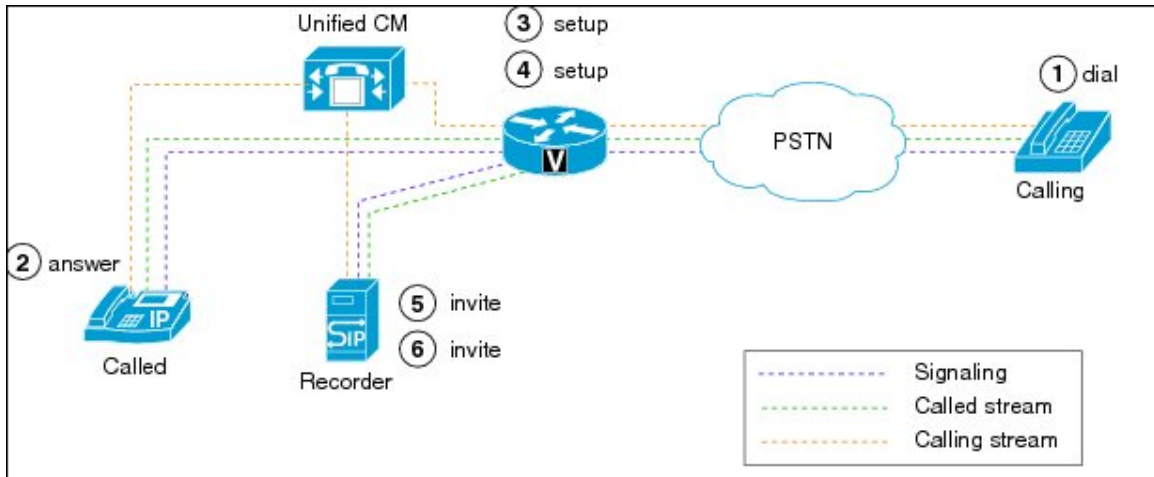
Network Based Recording supports the following recording modes: Automatic, Selective Silent, and Selective User. You can use Network Based Recording with Cisco CUBE Recording or Cisco MediaSense Recording.

The call flow for Network Based Recording is as follows:

1. Receive a call.

**Note:** The line on which the call is received is configured for automatic silent recording where the gateway is selected as the recording media source.

2. Unified CM automatically sends two call setup messages to the gateway.
3. Unified CM INVITES the recorder to both calls via SIP Trunk.
4. Recorder accepts both calls. and receives two RTP streams from the gateway.
5. Gateway forks both media streams to the recorder.



Configuring Network Based Recording is similar to Network Recording with the following exceptions:

- To enable a SIP trunk for Network Based Recording, select This trunk connect to a recording-enabled gateway check box in the Recording Information section on the SIP trunk page. For more on configuring the SIP trunk, see [Create a SIP Trunk that Points to the Recorder](#) on the Cisco website.
- Configure devices that you want recorded to support BIB-based Network Recording.
- Set the value for Recording Media Source to Gateway Preferred in the Directory Configuration page.

In a CUBE environment, Network Based Recording requires ISR-G2 Gateway (29XX, 39XX Series running 15.3(3) M or later. CUBE uses Extended Media Forking. See [Cisco Unified Communications Gateway Services—Extended Media Forking](#) on the Cisco website for more information.

## Server Recording (SPAN)

The Cisco Catalyst line of IP network switches support a feature called Switched Port Analyzer (SPAN), or port monitoring, that allows network traffic flowing through a particular switch port or group of ports to be copied and sent to a destination port. The Monitor service listening on this destination port can then get access to packets containing audio data representing a phone call. This method of packet capture is known as Server Recording.

For Server Recording, the Monitor service must be connected to the SPAN port on the switch that is connected to the phones you want to record. See *Configuring and Troubleshooting VoIP Monitoring* for more information on SPAN. This document is available on the Cisco website ([www.cisco.com](http://www.cisco.com)).

The Recordings folder for Server Recording is located on same drive where you installed the services for Cisco Quality Management.

Cisco recommends using a Redundant Array of Independent Disks (RAID) for storage reliability.

The following figure shows an example of Server Recording.

When configuring a Monitor Server for Server Recording, consider the following:

- Starting in 9.2, Cisco supports a Monitor Server installed on a VMware virtual machine instance. In previous versions, this was not supported due to potential issues with the VM configuration which led to Audio Quality issues. A Monitor Server can successfully be deployed in order to capture Audio packets for Server Based recording as long as the VMware Host and Virtual Machine configuration are set up properly to allow for proper sniffing of packets. If there are issues with Audio Quality when a Monitor Server is present, Cisco might require that you engage VMware to ensure the proper virtual configuration is present in order to successfully capture the audio packets to be recorded.
- The monitor server can handle 200 concurrent calls on a larger server.
- The Monitor Server must run on its own server that is separate from the Recording Server.

When considering the pros and cons of using the Server Recording, note the following:

### **Cons:**

- Server Recording is hard to scale
- The monitor cannot be virtualized because it is dependent on a dedicated NIC
- The monitor only supports 200 concurrent recording instances
- Desktop Recording cannot run in a Server Recording environment

## **Supported Remote Agent Configurations**

Some companies allow their agents to work offsite. You must use a remote agent configuration that is supported by Cisco Quality Management if you want to use Network Recording, Network Based Recording, or Server Recording.

## **Cisco MediaSense**

Cisco MediaSense performs network-based audio and screen recording. Cisco Quality Management then imports the MediaSense Recordings to the Recordings application in Unified Workforce Optimization.

The call data for a MediaSense Recording is derived from SIP messages sent to the MediaSense Cluster. The Session Initiation Protocol (SIP) messages are not as rich as JTAPI CTI messages, so some features do not work the same for MediaSense recordings. When a call is placed on hold, the MediaSense recording stops and the raw files are closed. When the call is retrieved from hold, a new set of raw files is created. This means a single call from the agent's perspective can result in multiple call sessions or segments. Cisco Quality Management displays each session as a distinct call. Multiple sessions that are logically related (contain the same session ID) will be linked as Associated Calls in the Recordings application. When you play back a MediaSense-recorded call, you must play each of the associated calls to hear the entire call from the agent's perspective.

The root call contains all call segments. Only the archive user can access the root call and all created contacts in the Recordings application. When the call is reconciled, the agent and supervisor only has access to the call segments in which they are scoped in the Recordings application. When a call is exported, the segments included in the call are based on the user's scope.

Recordings persist on Cisco MediaSense. Cisco MediaSense is responsible for the retention and cleanup of recordings on its system.

Cisco Quality Management supports Cisco MediaSense configured with:

- Cisco Unified CM—see the *Installation Guide* for version information.

For more information on Cisco MediaSense, see *Cisco Unified Contact Center Express (Unified CCX) Software Compatibility Guide* .

These documents are available on the Cisco website ([www.cisco.com](http://www.cisco.com)).

- Cisco Unified CM Built-in Bridge (BIB)—in this configuration, audio forking is done at the agent's IP phone.
- Cisco Unified Border Element (CUBE, Gateway, or SIP Trunk configuration)—in this configuration, audio forking is done at the CUBE.

Under normal operations, Cisco Quality Management receives real-time notifications from Cisco MediaSense when call recordings are ready for export. When the Cisco Quality Management Recording server receives notification, the Recording server immediately exports recordings and metadata from Cisco MediaSense. If Cisco Quality Management is offline, Cisco MediaSense continues to record calls. For example, Cisco MediaSense will record calls under the following circumstances:

- The MediaSense Subscription service or Network Recording service is offline.
- Cisco MediaSense was installed and running in production before Cisco Quality Management was purchased and installed.

Cisco Quality Management can retrieve these recordings when it returns to an online state so as not to miss any recordings.

Cisco Quality Management supports single and multiple Cisco MediaSense clusters. For more information on Cisco MediaSense configurations, see the relevant version of the following Cisco documents:

- *Installation and Administration Guide for Cisco MediaSense*
- *Solution Reference Network Design for Cisco MediaSense*
- *Release Notes for Cisco MediaSense*
- *Developer Guide Cisco MediaSense*

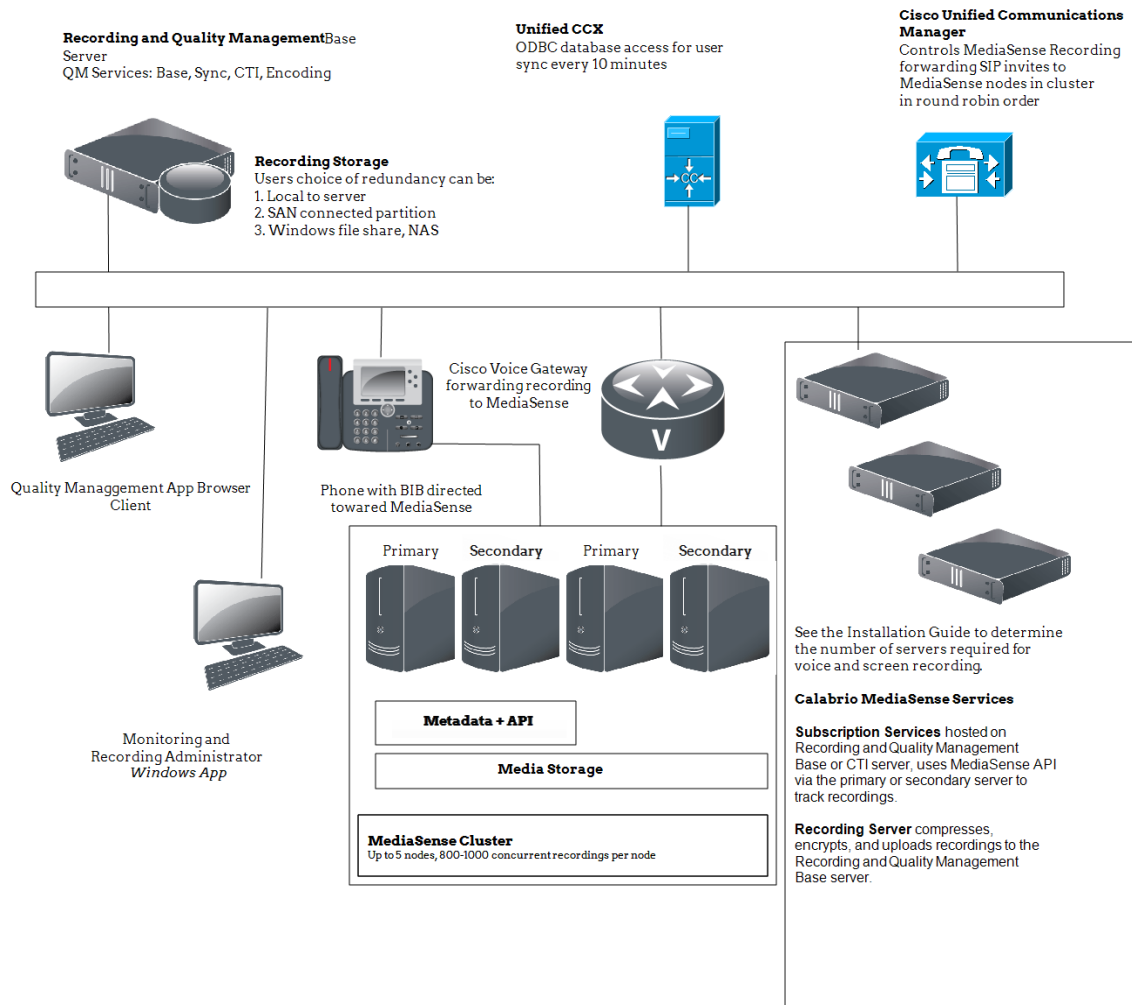
The Cisco MediaSense Subscription service can connect with both the MediaSense cluster's primary and secondary API services and will failover when the primary API services fail. The MediaSense Subscription service also includes a synchronization service that allows it to identify and capture any calls recorded by the MediaSense cluster while the MediaSense Subscription service is offline.

Cisco MediaSense implements redundant resiliency architecture with Unified CM configured to send recordings to each node in the cluster in succession providing redundancy. Recording sessions start with a SIP invite to the node which must respond to the invite within a timeout period or Unified CM will send the SIP invite to the next node in the MediaSense cluster. See the *SRND for Cisco MediaSense* for details.

Cisco MediaSense Recording uses the following components:

- MediaSense Subscription service—this service is hosted on the Cisco Quality Management Web Base server or CTI server and uses the Cisco MediaSense API through the primary or secondary node to track recordings.
- Recording server—recordings from the MediaSense node are compressed, encrypted, and uploaded to the Recording Server. Scalability for MediaSense recording is the same as Network Recording or Network Based Recording.

The following figure is an example of Cisco Quality Management in a Cisco MediaSense Recording architecture.



Per the *Solution Reference Network Design for Cisco MediaSense*, each server supports a maximum of 400 concurrent streams. Each call requires two streams, so the server supports a maximum of 200 calls. The MediaSense Subscription service recording upload process for Cisco Quality Management also effects scalability by using two streams per call at an accelerated transfer rate equivalent to 5 seconds to upload 60 seconds of the audio recording for a call. This affects the Cisco MediaSense server stream loads as follows:

$$400 \text{ streams per server} = 2 \text{ streams per call} \times (X + X \times (5\text{sec} \div 60\text{sec}))$$

where 5/60 is the recording upload time ratio and X is the number of calls that can be recorded and uploaded concurrently on a continuous basis. For example:

**Example:**  $X \text{ calls} = 400 \div (2 \times (1 + 5/60)) = 184.61 \text{ concurrent calls}$

Rounding down with some extra margin results in a concurrent call recording capacity for each Cisco MediaSense server doing immediate uploads of 180 concurrent calls.

If you scale up to a maximum Cisco MediaSense cluster size of 5 servers, the maximum number of concurrent recorded calls per cluster is 900.

## Gateway Recording

Gateway Recording is the process of recording calls at the Session Border Controller (SBC) or Gateway before they are handled by a private branch exchange (PBX) or Automatic Call Distributor (ACD).

Gateway Recording simplifies how recordings are done by focusing on the call as it is handled by the SBC and not dealing with the complexities of tracking and following calls around the contact center.

This is due to the nature of the call flow with an SBC. When a call comes into a contact center, a Gateway or SBC is usually the first device to handle the call. The SBC routes the call to the appropriate PBX or ACD and stays in line with the call until the call has ended, even if no humans were on the call.

For Gateway Recording, the agent on the call is unknown at the time of the call. The call is not recorded from the agent's point of view, but it is recorded from the caller's point of view. This means a single recording can include the caller's interactions with Interactive Voice Response (IVR), Self Service Portals, conversation with multiple agents as the call is transferred to different agents, and cases where the call is conferenced. Everything that an external caller would hear is recorded and reviewed at a later time to determine how well a customer is able to navigate the various technologies.

Gateway Recording is simple to configure. You can configure an SBC to send its signaling message to the appropriate signaling service. The signaling service is responsible for handling all incoming and outgoing messages to the SBC, parsing the SBC message, and sending the messages to the Recording server. The Recording server is responsible for registering with a signaling service, sending the signaling service its concurrent capacity, and recording RTP or retrieving a recording made by another recording system, such as MediaSense.

Gateway Recording requires that you:

- Install the proper signaling service.
- Configure a telephony group.
- Configure an "Inactive" archive workflow—This workflow dictates when a gateway voice recording will be uploaded.

Note that these required configuration items only allows a user with the archive role to see voice recordings.

You can optionally enable reconciliation. Reconciled recordings are available to agents, supervisors, managers, and evaluators based on Cisco Quality Management scoping rules. Enabling reconciliation requires that you:

- Install the Reconciliation service.
- Configure CDR under Enterprise Settings in Quality Management Administrator.



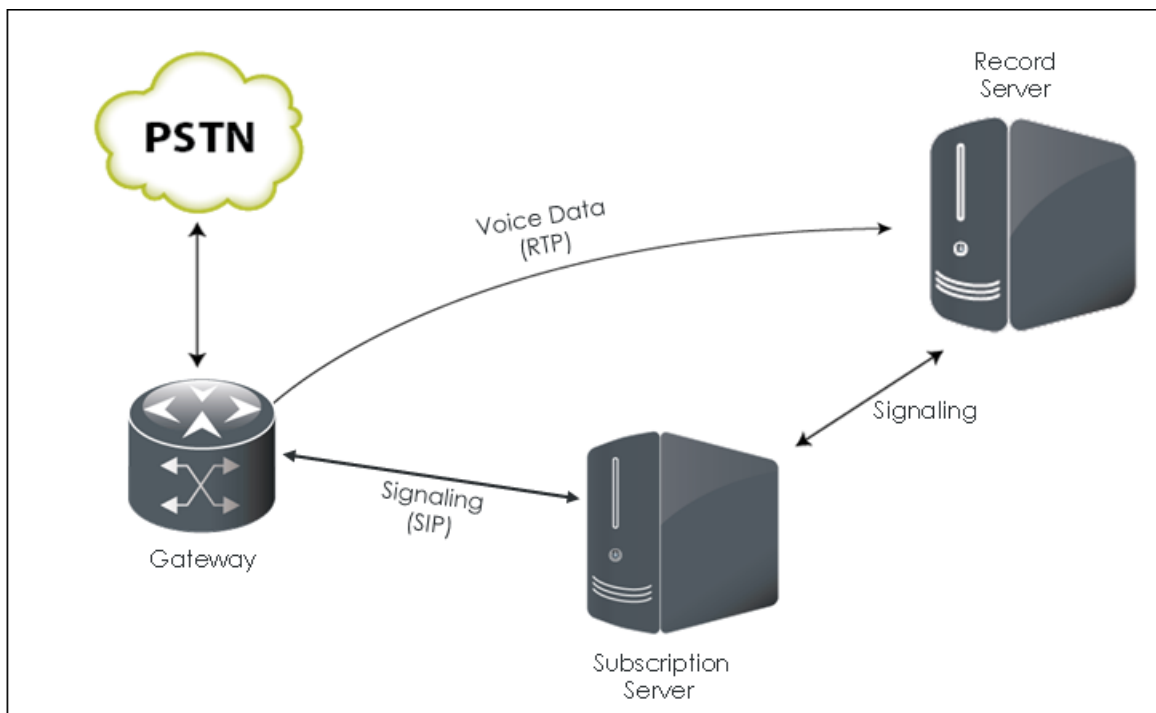
- Configure a quality management workflow—this dictates what reconciled gateway voice recordings will be saved for quality management as well as the retention times for reconciled recordings.
- Configure an archive workflow—this dictates what reconciled gateway voice recordings will be saved for archive as well as the retention times for reconciled recordings.

Voice recordings will upload whether they are reconciled or not. Once reconciled, the quality and archive workflow will be applied to determine what is saved and what is deleted.

Screen recording in a Cisco CUBE Recording via SIP Recording environment requires that you:

- Install the Desktop Recording Service on the client desktop where screen recording will occur.
- Install the CTI service.
- Configure a CUCM telephony group in Quality Management Administrator to receive JTAPI signaling that will trigger screen recording. You must select the Endpoint Only Does Screen Recording check box. If the CTI service is installed as on the same server as the subscription service, you must clear the Enable Network Recording check box (to avoid multiple services listening for SIP messages on port 5060).
- Configure a quality management workflow—this dictates what reconciled gateway screen recordings will be saved for quality management.

Screen recordings are not uploaded until the associated voice files are reconciled first. Once reconciled, the screen recordings will be uploaded per the quality management workflow settings.



**Pros:**

The advantages of Gateway Recording are as follows:

- Gateway Recording captures the whole customer experience—the call does not require an agent to be recorded.
- Simplified recording infrastructure—recording is not dependent on third party APIs (only one API).
- Simplified configuration—everything is recorded and no workflow processing is required. Calls are filtered based on what is in the Inclusion/Exclusion list. You do not need to install anything on a desktop, except for the screen recording option available in the Desktop Recording service.

**Cons:**

The disadvantages of Gateway Recording are as follows:

- Consultation portions of a call are not recorded. The recording consists of what the customer hears.
- Gateway Recording does not provide controls for what is recorded. You can only filter

what calls are recorded based on calling/called numbers.

- Gateway Recording does not have access to all data typically found in Recording and Quality Management. This information must be reconciled from other sources.
- The pause and resume commands are supported, but note that the audio is not removed during the pause period until after the call is successfully reconciled. Screen recording is paused and resumed in real time (at the endpoint).
- Does not support hot desking

When configuring your system for Gateway Recording, remember the following points:

- Voice clusters are assigned to a Site Upload server.
- The Recording server only handles voice recording. It does not handle screen recording.
- In a Compliance environment, users are only configured to access recordings.
- Only calls that go through the Cisco CUBE Recording via SIP Recording are recorded. This can limit the number of agent-to-agent interactions that are recorded.
- Depending on the data available at the SBC or Gateway, screen recording might be limited.
- Gateway Recording supports a subset of commands in the Recording Controls API or the Recording Controls application. See the following documents for a list of supported commands:
  - *Cisco Recording Controls API Programmers Guide*
  - *Cisco Recording and Quality Management User Guide*
- Gateway Recording assumes that all recordings will be uploaded (that is, 100% archiving).
- Contact reconciliation of recordings is not required. If the contact center only uses the CR or CRS+ license, there is no need to perform the reconciliation process. Contact reconciliation is only required for contact centers that want to perform quality scoring or play back contacts for specific agents, including screen recordings.
- Contact reconciliation will yield multiple records for the same recording and multiple users might be associated with the same recording.
- A default archive workflow will be assigned to each recording that specifies retention and

End of Day (EOD) settings. Since a recording might be associated with multiple contacts, it will only be marked for deletion when all contacts have exceeded their retention period for the recording.

- Agent-to-agent calls are not recorded.
- When you use the pause and resume commands, note that the audio is not removed during the pause period until after the call is successfully reconciled. Screen recording is paused and resumed in real time (at the endpoint).
- Hot desking is not supported with Gateway Recording.

The Gateway Recording architecture (including Cisco MediaSense Recording method) has the following limitations:

- Cisco does not support Desktop Recording as a backup method for Gateway Recording.
- Cisco does not support SRTP with Gateway Recording.
- Cisco does not support MANA CDR (QM3002 notification trigger) with Gateway Recording. The MANA CDR report does not support devices that are recorded by Gateway Recording. If your site is a mixed-recording environment where Server Recording, Network Recording, or Network Based Recording, and Gateway Recording are used together, the CDR report will not be accurate since Gateway Recording devices result in false positives.
- Cisco does not support Direct Outbound Recordings (Blog recordings) with MediaSense Recording.
- All gateway calls (CUBE, Acme, or Sonus) are treated as outbound calls.

If you are using Gateway Recording, DB Cleaner deletes recordings when:

- A root contact was broken into segments and none of the segments matched any workflows required to save the recording (the root contact's default workflow is ignored).

**EXAMPLE:** When you specify the Don't Record classifier for an archive workflow in a Gateway Recording environment, DB Cleaner will delete the recorded call. If a user in a team assigned to this archive workflow sends the Record Tag command, the recorded call will not be deleted.

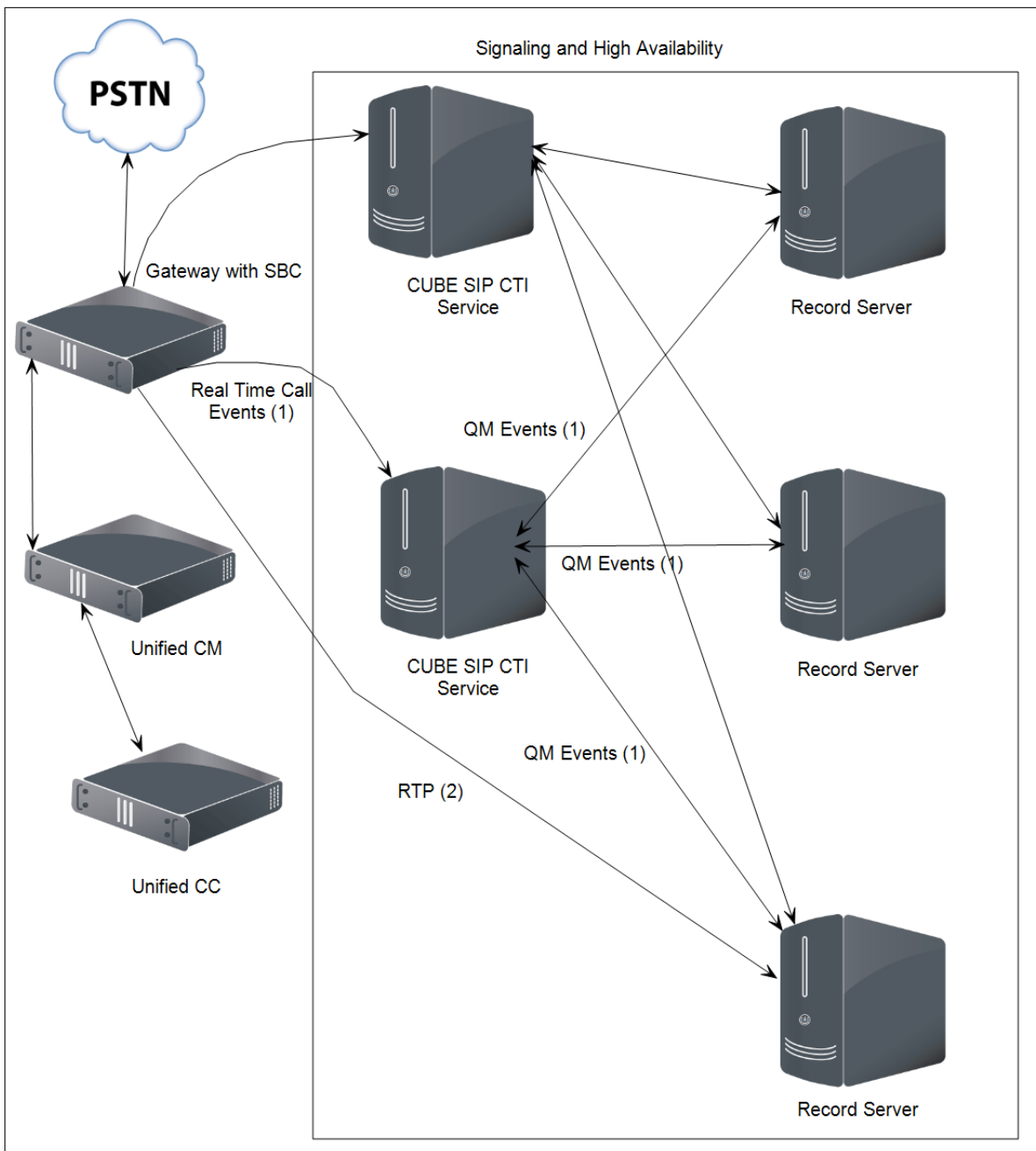
- One or more segments were saved based on their workflow and they are deleted when

all of the non-root contact retention times have expired.

- The root contact was not broken into any segments (no agents were involved in this recording) and the recording will be cleaned when the root retention time has expired.

### Cisco CUBE Recording via SIP

The following figure is an example of resiliency for Cisco CUBE Recording.



## Configuring a Server for Screen Recording

You can configure Cisco Quality Management to allow screen recordings to be stored in locations other than on the agent's local PC. This topic provides procedures for configuring network servers to store agent's screen recordings.

In the default screen recording configuration, the desktop recording client records the screen recording for the agent to the local drive that points to the record server storage location. The desktop client moves the screen recording and .INI files to the two-stage recording location on the record server location, using windows file transfer to the configured UNC path. The record server then detects the files in the two-stage folder and moves them to the server daily folder where they are stored until upload to the permanent storage location in the main data center.

### *To configure network servers for storing screen recordings:*

1. Create the storage location on a local record server or Storage Area Network (SAN) in which the screen recordings will be stored.
2. Map a folder in the storage location for each user as a local drive on their PC. This location must be consistent for each user in a location.

**Note:** The folder cannot be a mapped drive; it must appear local to the PC's operating system.

**Example:** An R:\recording drive on the agent's PC points to the Record server or SAN on E:\Recordings\\.

3. Update the properties file for each location, to identify the correct path to the agent's PC.
4. Install the Desktop Recording Client on each PC.
5. Override the default screen recording location by pushing out the updated configuration file to C:\Program Files (x86)\Common Files\QM\config.
6. Restart the recording service.

The client capture service writes a recording file to SAN storage while it records the screen video. It then encrypts the recording file and moves the recording file to the network file share.

For two-stage uploads, immediately or at the specified time, requests to upload the recording file to the upload server. It then transfer the encrypted recording to the upload server, which writes it to the specified recording storage location.

**Note:** Each team to which agents are assigned in the ACD must be contained in a *single physical location* so they are uploaded to the correct two-stage upload location. Each physical location can contain multiple teams.





# Resiliency Options

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This section describes the options for improving resiliency in your Cisco Quality Management environment.

## High-level Call Flow

The call flow for Cisco Quality Management is as follows:

1. Receive a call.
2. Record voice.
3. Process the workflow.
4. Upload metadata.
5. Upload recordings.

## CTI and Signaling Services

Cisco Quality Management recording can survive when the CTI and signaling services are configured for resiliency as follows:

- CUBE—configure a second CUBE server to take over if the primary CUBE server fails, so the CUBE SIP CTI service can continue to receive SIP INVITES. This solves a server failure (because both the CUBE and the Recording Server will failover to the backup CTI), but it does not address asymmetrical communication failure.

**Example:** CUBE can still communicate with the primary server, but the Recording Server cannot communicate with the primary server.

- Unified CM—configure a backup CTI server for your primary CTI server to continue receiving CTI events. See [CTI Service](#) for requirements and additional information on how the CTI server will behave.

## Microsoft SQL Server

See the Microsoft documentation for resiliency options.

## Signaling

Prior to version 10.0, Cisco Quality Management used primary and backup Recording Servers to minimize application downtime. Version 9.1 or later uses recording clusters and signaling to minimize application downtime.

A recording cluster is a group of one or more Recording Servers. A Recording Server indicates which recording cluster it belongs to when it connects to a signaling service.

The signaling service will load the recording cluster configuration and register devices assigned to the recording cluster. Calls will be distributed to the Recording Servers on a call-by-call basis to the least busy Recording Server in the recording cluster.

If one of the Recording Servers fails, the signaling service will route calls to the remaining Recording Servers in the recording cluster.

## Cisco Quality Management

Cisco Quality Management provides a layered approach to call recording resiliency by providing options to add redundancy at multiple layers. The following topics describe the key layers and redundancy options.

### Application

The Cisco Quality Management Base server (primary server) hosts the browser-based user interface, called Unified Workforce Optimization. You can use a standby server (also known as an offline server) to minimize application down time. The standby server is deployed when the primary server fails after restoring the Cisco Quality Management SQL database connection and the recording storage share. The standby server assumes the hostname and IP address of the primary Web Base server to restore communications with user interface and the recording services.

### User Licensing

User licensing is maintained in the Cisco Unified CCX CVD license repository. Once the standby server is configured to connect to Unified CCX, the standby server will have access to the same set of licenses as the primary server.

### SQL Database

The Cisco Quality Management SQL database contains the recording metadata required when searching contacts from the Recordings application and the configuration information that is used to enable recording services. Therefore, availability of this SQL database is critical to Cisco Quality Management application availability and the uploading of new recordings from the recording services.

There are a variety of SQL database redundancy options available.

**Example:** SQL clustering, redundant storage, and backup and restore.

When determining the redundancy option you want to use, consider the following:

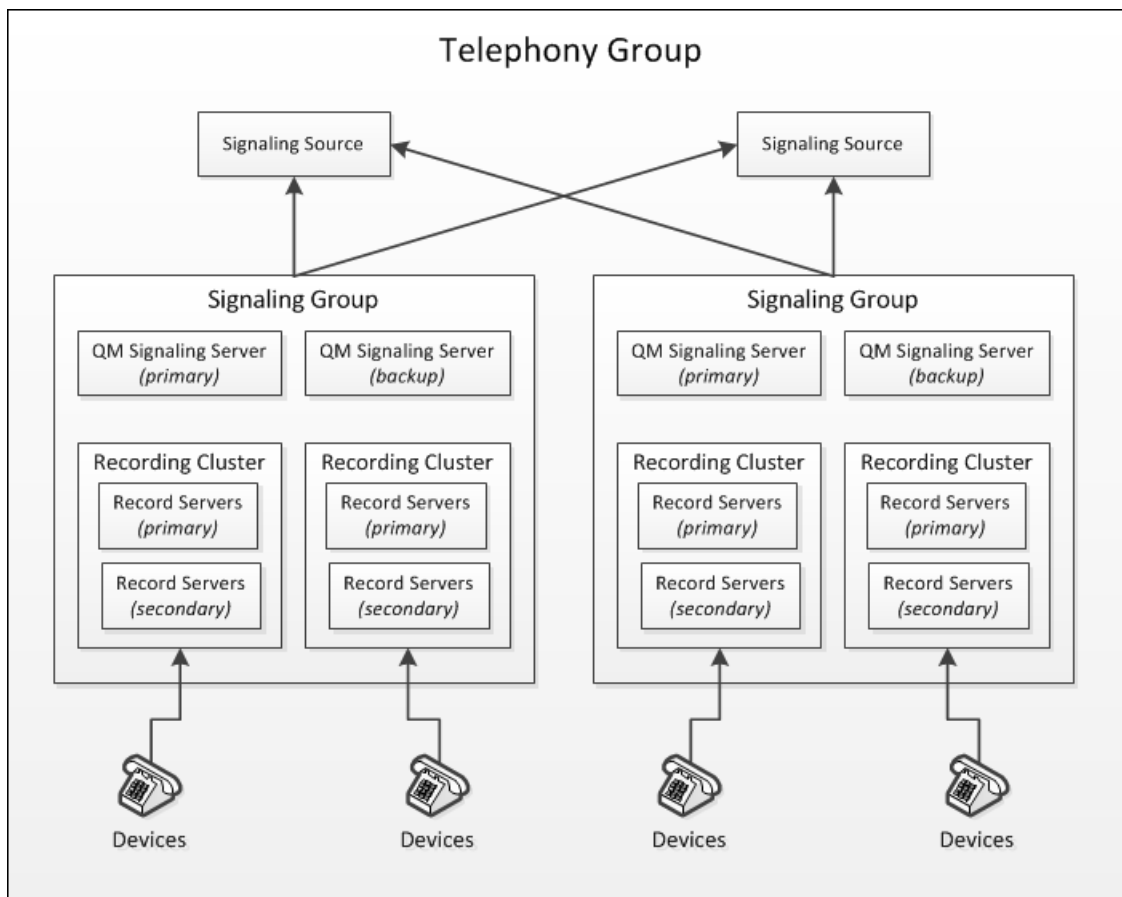
- The SQL database host must be available to service the Recording and Quality Management requests from either the primary server or the standby server and must have enough capacity to support the Cisco Quality Management performance and scaling.
- For resiliency, install the SQL database on a separate server from the Web Base server and use SQL Server resiliency options (for example, clustering to ensure continuous availability).
- If you are using SQL Server clustering, the Cisco Quality Management database must be installed in a dedicated SQL server instance. No other database can be installed on this instance.
- Use of point-in-time backup and restore approaches might result in a lack of access to recordings completed between the time of the backup and the restoration of the services for Cisco Quality Management. Recordings made during this time might be assigned to duplicate IDs (CCR #) since the restored database would not reflect IDs distributed after the backup. In the case of duplicate IDs, only the first recording uploaded with that ID would be available in the Recordings application, the second recording would be uploaded but not available using a search. Due to this known issue, and other potential problems, an SQL Server resiliency approach such as clustering with resiliency storage is recommended.

**Note:** Cisco expects partners and customers to be familiar with Microsoft SQL and the available redundancy options to make their own decisions based on considerations provided here.

## Telephony Groups

Cisco Quality Management allows you to add backups for the signaling source, signaling group, signaling server, recording cluster, and devices. Adding any one of these backups is optional. However, Cisco recommends using backups for resiliency purposes.

**Note:** Some telephony group types do not support a backup signaling source.



### Telephony Group Considerations

The following table describes what is supported based on telephony group type.

Telephony Group Type	Changes
UnifiedCM	<p>A telephony group can have any number of signaling groups.</p> <p>Each CTI service in a signaling group can have a separately administered list of Unified CM CTI Managers to connect to for JTAPI.</p> <p>A signaling group can have any number of Recording Clusters.</p>
All Others	<p>All other telephony group types can support multiple telephony groups, but they are restricted to a single signaling group and Recording Cluster per telephony group. CUBE supports primary and backup signaling services, but MediaSense supports only a single signaling service.</p>

## Recording Storage Share for Cisco Quality Management

A wide variety of Windows file share and/or redundant disk storage options are available. When determining the recording storage share option you want to use, consider the following:

- Recording storage share must be restored and available to the primary or standby server to resume recording upload from the recording services and recording playback from the Recordings application.
- An external high-availability storage solution is recommended over point-in-time backup and restore. The external high-availability storage solution avoids issues with recordings that might upload between the time of the backup and the Web Base server failure.

**Note:** Cisco recommends that RAID storage solutions include optional battery backup to safely enable write caching, as this generally provides a significant increase in the Input/Output Operations Per Second (IOPS) performance. This is specifically recommended for deployments using Cisco UCS C series servers.

## User Synchronization Service with ACD

Cisco Quality Management can be configured with redundant ACD connections that will automatically failover to the secondary connection if the primary connection fails.

## Call Event Notification

Cisco Quality Management relies on receiving the call event feed from Unified CM from the JTAPI interface. QM provides a Cisco Unified CM window in the System Configuration Setup tool that allows the administrator to designate a primary and secondary Unified CM servers within the cluster. When a failure is detected in the CTI feed, Cisco Quality Management will automatically failover to the next configured Unified CM.

## CTI Service

You can deploy a primary and backup CTI service on different physical servers. Cisco Quality Management software will manage the automatic failover of the CTI service between these services, ensuring the recording services always receive call recording trigger events (for example, start and stop event) which are required for recording.

When using primary and backup CTI services, the CTI services need to be set up in a top-down route list when you configure SIP trunk for Network Recording in Cisco Unified CM. When the primary CTI service goes down, the backup CTI service will start receiving CTI events from Unified CM. See the Cisco Unified CM documentation for more information on configuring a top-down route list.

The SIP OPTIONS Ping must be enabled on the backup CTI server for the SIP Trunks' SIP profile on Unified CM. The maximum time after failover until the calls start recording again is determined by the Ping Interval for Out-of-service SIP Trunks setting in the SIP Trunks' profile.

### **Recording Services**

You should also consider how you deploy some of the supported recording types when you configure your system for redundancy.

### **Recording Clusters**

You can add as many Recording Servers to a recording cluster as you want to achieve resiliency and capacity improvements. A recording cluster is a group of one or more Recording Servers. A Recording Server indicates which recording cluster it belongs to when it connects to a signaling service. When using recording clusters, consider the following:

- Recording stops on the Recording Server when the Network Recording service or hardware fails. The remainder of the current call is not recorded.
- Recording resumes on the backup Recording Server at the start of the next call.

### **Distributed Desktop Recording Services**

The Desktop Recording service is installed and runs on client desktops. The Desktop Recording services leverages the call events from the Monitoring and Recording CTI service to start and stop voice and screen recording on the user's desktop. Since each recorded user has their own independent recording service to record their calls, a Desktop Recording service failure only impacts the single user being recorded by that service. It is expected that the recorded user will move to another functioning phone and desktop, with the Desktop Recording services installed, to resume recording after a failure event.

If the Desktop Recording service cannot connect to the Cisco Quality Management database when a user logs in, the user will not be recorded.