



## **CTI Product Description Guide for Cisco Unified Contact Center Enterprise**

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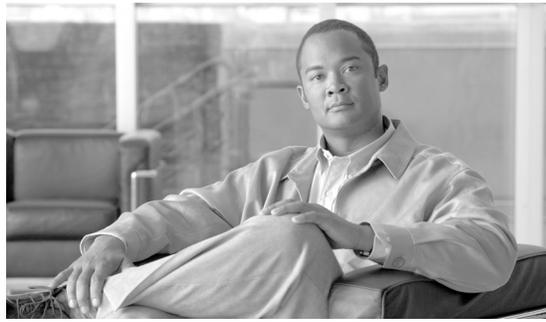
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## About This Guide

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### Purpose

This manual provides an introduction to Computer Telephony Integration (CTI), as well as an overview and description of the products that are contained in Cisco CTI. Included is discussion on how to integrate CTI client applications with Unified Intelligent Contact Management (Unified ICM).

### Audience

This manual is intended for both non-programmers and programmers who want to learn about CTI in general, and Cisco CTI in particular. The reader of this manual need not have knowledge of Unified ICM; however, a knowledge of Unified ICM is necessary for implementing Cisco CTI.

### Organization

The following table describes the information contained in each chapter of this guide.

Chapter	Description
<a href="#">Chapter 1, “What is CTI?”</a>	Provides information on CTI in general, as well as on Cisco’s specific realization of CTI. This chapter also presents the components that make up Cisco CTI.
<a href="#">Chapter 2, “Cisco CTI Server Software”</a>	Provides an overview of the ways in which CTI clients can work together with the CTI Server and Unified ICM.
<a href="#">Chapter 3, “Cisco CTI Object Server (CTI OS) Software”</a>	Describes the CTI OS software components that are contained in Cisco CTI.
<a href="#">Chapter 4, “Cisco Agent Desktop (CAD) Software”</a>	Describes the CTI Desktop software components that are contained in Cisco CTI.

## Related Documentation

Documentation for Cisco Unified ICM/CCE, as well as related documentation, is accessible from Cisco.com at

<http://www.cisco.com/cisco/web/psa/default.html?mode=prod>.

- Related documentation includes the documentation sets for Cisco CTI Object Server (CTI OS), Cisco Agent Desktop (CAD), Cisco Agent Desktop - Browser Edition (CAD-BE), Cisco Unified Contact Center Management Portal, Cisco Unified Customer Voice Portal (Unified CVP), Cisco Unified IP IVR, Cisco Support Tools, and Cisco Remote Monitoring Suite (RMS).
- For documentation for these Cisco Unified Contact Center Products, go to <http://www.cisco.com/cisco/web/psa/default.html?mode=prod> click on **Voice and Unified Communications**, then click on **Cisco Unified Contact Center Products** or **Cisco Unified Voice Self-Service Products**, then click on the product/option you are interested in.
- For troubleshooting tips for these Cisco Unified Contact Center Products, go to <http://docwiki.cisco.com/wiki/category:Troubleshooting>, then click the product/option you are interested in.
- Also related is the documentation for Cisco Unified CM, which can also be accessed from <http://www.cisco.com/cisco/web/psa/default.html?mode=prod>
- Technical Support documentation and tools can be accessed from <http://www.cisco.com/cisco/web/support/index.html>
- The Product Alert tool can be accessed through (login required) <http://www.cisco.com/cgi-bin/Support/FieldNoticeTool/field-notice>

## Conventions

This manual uses the following conventions:

Format	Example
Boldface type is used for user entries, keys, buttons, and folder and submenu names.	Choose <b>Edit &gt; Find</b> from the Configure menu bar.
Italic type indicates one of the following: <ul style="list-style-type: none"> <li>• A newly introduced term</li> <li>• For emphasis</li> <li>• A generic syntax item that you must replace with a specific value</li> <li>• A title of a publication</li> </ul>	<ul style="list-style-type: none"> <li>• <i>A skill group</i> is a collection of agents who share similar skills.</li> <li>• <i>Do not</i> use the numerical naming convention that is used in the predefined templates (for example, <b>persvc01</b>).</li> <li>• IF (<i>condition, true-value, false-value.</i>)</li> <li>• For more information, see the <i>Database Schema Guide for Cisco Unified ICM/Contact Center Enterprise &amp; Hosted.</i></li> </ul>
An arrow ( > ) indicates an item from a pull-down menu.	The Save command from the File menu is referenced as <b>File &gt; Save</b> .

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For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

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# CHAPTER 1

## What is CTI?

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This chapter provides a context understand CTI. It includes the following:

- Discussion of what CTI is and why it is useful
- An example of Cisco's approach to CTI
- Introduction to Cisco CTI and its individual components



### Note

Throughout this document the presentation will be cast in terms of *telephones* and *calls*. This is in part because it takes a while for terminology to catch up with reality (sometimes it never does—for example, one still speaks of “dialing a phone number” even when there is no dial). However, keep in mind that *telephony* represents a *medium*, and a *call* is an *interaction*. The medium might just as well be the Internet. The interaction might just as well be an e-mail message, a faxed document, or a Web entry. The underlying Cisco technology will work the same regardless of the medium or the interaction.

---

## Computer Telephony Integration

The workflow of a modern contact center is based on two main areas: the media for communicating with the customer and the platform for servicing customer requests.

CTI is the integration of the communications media (that is, phone, e-mail, or web) with the customer service platform (that is, customer databases, transaction processing systems, or CRM (customer relationship management) software packages).

Integrating communications media with the customer service platform helps agents to service customers better and faster in two ways. First, it enables the agent to leverage the information and events provided by the media to direct his workflow. Second, it increases the depth and breadth of customer information presented to the agent when the customer's contact arrives at the workstation.

## What is a CTI-Enabled Application?

A software used by the agent to service a customer request, which is driven by the information generated from the presentation of the customer contact.

## Screen Pop

The most common CTI application is a screen pop. In a screen pop, the customer service platform is provided with customer information at the arrival of a phone call and begins processing the customer's transaction at the same time as the communication begins between the customer and the agent. This transfer of customer information is called the call context information: a rich set of customer-specific data that travels with the call throughout the enterprise.

For example, a screen pop application for a cellular telephone company might be triggered based on the arrival of a phone call. It uses the customer ANI (automated number identification, or calling line ID) to do a database look up to retrieve the customer's account information and displays this customer record for the agent. By the time the agent can say "Thank you for calling ABC Telephony Company," the account record is on his screen and he is ready to service the customer's request.

## Agent State Control

Similar to a screen pop, CTI application control of agent state is a way to improve the agent's workflow by integrating the service delivery platform with the communications media. A CTI application enabled for agent state can set the agent's current work state according to the type of work being performed.

For example, a sales application might automatically send an agent to a wrap-up or after-call work state when the customer contact terminates. The agent could then enter wrap up data about that transaction or customer inquiry and (subject to a timer) have his state changed automatically back to available when the wrap up work has been completed.

## Third-Party Call Control

The most advanced CTI integration projects seek a total integration of the customer service platform with the communications media. In third-party call control applications, the actual control over the agent phone or other media is initiated via the software application, and coordinated with application screens or views.

For example, a financial services application might perform the transfer of a phone call to a speed-dial number designated by the application itself. In this kind of scenario, the agent could click one button to determine the appropriate destination for the transfer, save the application's customer context, and transfer the call to the other agent.

## Leveraging CTI Application Event Flow

The first step to developing a CTI-enabled application is to understand the events and requests that are at play within the CTI environment. Asynchronous events are messages sent to applications that indicate an event to which the application can respond (for example, `BeginCallEvent`). Requests are the mechanism that the application uses to request that a desired behavior happen (for example, `TransferCall`).

## Asynchronous Events

The CTI environment is one of diverse servers and applications communicating over a network. This naturally leads to asynchronous, or unsolicited events—events that arrive based on some stimulus external to the user’s application. The main source of events in the CTI environment is the communications media.

Figure 1-1 depicts the stages of a typical inbound telephone call and its associated events:

**Figure 1-1** Typical Inbound Call Events Flow



The following events are generated, based on the state of the call:

- `BEGIN_CALL` event indicates that the call has entered the setup phase.
- `CALL_DELIVERED` event is generated when the call starts ringing.
- `CALL_ESTABLISHED` event is generated when the call is answered.
- `CALL_CLEARED` event is generated when the voice connection is terminated (for example, call hung up).
- `END_CALL` event is generated when the logical call appearance (including call data) is complete.

In addition to the events and states shown in Figure 1-1, the following are typical call events used for CTI applications:

- `CALL_HELD` event is generated when the call transitions from the active to held state.
- `CALL_RETRIEVED` event is generated when the call is removed from hold.
- `CALL_TRANSFERRED` event indicates that the call has been transferred to another party.
- `CALL_CONFERENCED` event indicates that a new party has been added to the call.

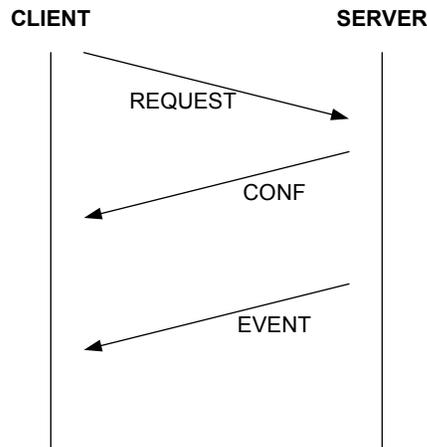
The foregoing is only a brief sample of the events available via Cisco CTI. For a complete set of events that are available for CTI developers, refer to the *CTI Server Message Reference Guide*.

## Request-Response Paradigm

In addition to being able to respond to asynchronous events, a CTI enabled application can make programmatic requests for services via the CTI interface. Specifically, the CTI application uses the request-response mechanism to perform agent state and third-party call control, and to set call context data.

The typical request-response flow for CTI uses the model shown in Figure 1-2.

**Figure 1-2** Sample Request-Response Message Flow



A request generated by the CTI-enabled application (CLIENT) is sent to the CTI service (SERVER), and a response message (CONF) is generated to indicate that the request has been received. In most cases if the request is successful, a follow-on event will be received indicating that the desired behavior has occurred.

## An Example of Cisco CTI at Work

The following Artificial example illustrates a number of the aspects of Cisco CTI.

1. A customer, Pierre, calls the XYZ Company from home.
2. The Cisco CTI software looks at the ANI, compares it to a database, and determines that the caller is Pierre, and that Pierre's native language is French.
3. From the Dialed Number Identification Service (DNIS—a string of digits indicating the number dialed by a caller, which Unified ICM uses along with the trunk group to indicate the destination for a call), the Cisco CTI software discovers that Pierre is calling the special "800" number set up for XYZ's new offer for upgraded services.
4. Pierre's call is routed to a French-speaking IVR, which collects information from Pierre and presents the various offers to him. However, Pierre has some particular questions that he wants to ask, and presses 0 in order to speak with an agent.
5. Pierre is transferred to another call center, where there is a French speaking agent familiar with the product that Pierre is interested in talking about. Through a screen pop, the agent receives the information that Pierre gave to the IVR.
6. Responding to Pierre's questions, and using the IVR information, the agent efficiently completes Pierre's current transaction.
7. In addition to the IVR-collected information, the screen pop also displays the results of various database lookups. From one of these, involving Pierre's past dealings with the company, the agent recognizes the possibility of Pierre's being interested in another offering that compliments the one he called about. Pierre is interested.

8. After completing this second transaction, the agent mentions to Pierre that the last time Pierre called he was concerned about a mistake in his monthly statement. (This was also displayed in the screen pop as a result of a database lookup.) Was that resolved to his satisfaction? It was. Pierre thanks the agent for the prompt and courteous service, and hangs up.

## An Example of a Positive Interaction

What was good about the preceding example was that:

- Though Pierre requested to be transferred from IVR to agent, the *automatic* routing both to the IVR, and to the agent at another call center, was correct each time. There was no aimless rerouting and bouncing around from one agent to another. This was made possible, in large part, by the *centralized* knowledge of the whole system (including multiple call centers) that was available to the Cisco CTI software.
- Pierre never had to restate any information that he had already put into the system; the information flowed with his call. All of this led to a decrease in *costs* for XYZ and an increase in *satisfaction* for Pierre.
- The agent was more *productive* because the call received required precisely the *expertise* that the agent had.
- The agent was also made aware of, and used, the opportunity for *up-selling*.
- Because of the knowledge the agent had of Pierre's previous interactions with XYZ, the agent was able to bring a *personal*, helpful touch to the current interaction.
- The result: a *quality* experience for both Pierre and XYZ.

## Introduction to Cisco CTI

This section gives an introduction to Cisco CTI. It includes the following:

- Purpose of Cisco CTI
- Brief description of the individual components that make up Cisco CTI

## What is Cisco CTI?

Cisco CTI is a product set that helps programmers integrate CTI applications with Unified ICM.

Cisco CTI consists of:

- Unified ICM
- CTI Servers
- Desktop Components
- Application Programming Interfaces (APIs) for custom applications
- Sample Applications
- Documentation
- Training
- Support

## Cisco CTI Components

This section describes the various components of Cisco CTI. It discusses the following:

- Product Offerings
- Software
- Documentation
- Support
- Training

## Product Offerings

Currently Cisco CTI consists of the following product offerings, which are discussed in more detail in separate chapters in this guide.

- **Cisco CTI Server.** The component that delivers agent, call, and customer data in real time and enables third-party call control.

See [Chapter 2, “Cisco CTI Server Software”](#) for more information about this product.

- **Cisco CTI Object Server (CTI OS).** The Computer Telephony Integration Object Server (CTI OS) is Cisco’s next generation customer contact integration platform. CTI OS combines a powerful, feature-rich server and an object-oriented software development toolkit to enable rapid development and deployment of complex CTI applications. Together with the Cisco CTI Server Interface, CTI OS Server and its CTI OS Client Interface Library (CIL) create a high performance, scalable, fault-tolerant three-tiered CTI architecture, as illustrated in [Chapter 3, “Cisco CTI Object Server \(CTI OS\) Software”](#).

This product includes:

- Out-of-the-box agent desktop and supervisor desktop: **CTI Toolkit Agent Desktop** and **CTI Toolkit IPCC Supervisor Desktop**. These products provide a desktop for agents or supervisors to answer and process calls.
- Developer’s Toolkit: The CTI Toolkit (CTI OS) provides programmers with the tools required to rapidly develop high-quality CTI-enabled applications, taking advantage of the rich features of the CTI OS server. CTI OS provides an object-oriented CTI interface by defining objects for all call center interactions (for example, agents, calls, skill groups). The extensive *CTI OS Developer’s Guide for Cisco Unified ICM/Contact Center Enterprise & Hosted* addresses the CTI OS Client Interface Library API for the C++, COM, Visual Basic, .NET, and Java programming environments.
- Siebel 7 integration: **CTI Driver for Siebel 7**. Driver that interfaces the Siebel Enterprise Relationship Management application with Cisco’s CTI products. Refer to the *CTI Driver for Siebel 7 Reference Guide for Cisco Unified ICM/Contact Center Enterprise & Hosted Editions* for detailed information.

See [Chapter 3, “Cisco CTI Object Server \(CTI OS\) Software”](#) for more information about CTI OS.

Refer to the *CTI OS Agent Desktop User Guide for Cisco Unified ICM/Contact Center Enterprise & Hosted* and the *CTI OS Supervisor Desktop User Guide for Cisco Unified ICM/Contact Center Enterprise & Hosted* for more information about these products.

- **Cisco CTI Toolkit (GeoDCS).** An earlier CTI package for use in developing applications. This package was superseded by CTI OS. This package includes: CTI Desktop Softphone, Softphone Controls, Desktop Control Server (DCS), CTIClient, JavaClient, CTI Driver for Siebel 6.

- **Cisco Toolkit Agent Desktop.** A packaged CTI solution providing an out-of-the-box desktop, supervisor features (such as supervisor to agent text chat), and the ability to create screen pops using keystroke macros rather than custom code.

Refer to the Cisco Agent Desktop documentation for detailed information about using this product.

## Software

### CTI OS and the CTI Driver for Siebel 7 CD

- CTI OS Server
- CTI OS Agent
- CTI OS Supervisor
- CTI Driver for Siebel 7
- CTI OS Toolkit -- lets you develop applications using the CTI OS CIL in C++, COM, Visual Basic, .NET, or Java.

**Note**

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The products on this CD have been developed for Cisco CTI Releases 7.0(0) and later.

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### Cisco Agent Desktop Agent

**Note**

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This product's software is included on a separate Cisco CAD CD.

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- **Cisco Agent Desktop Agent.** The module providing out-of-the-box desktop capabilities as well as workflow automation (including screen pop) via keystroke macro recording.
- **Cisco Agent Desktop Enterprise Data.** The module providing IVR and other call context data to the agent desktop.
- **Cisco Agent Desktop Call/Chat.** The module enabling agents to communicate with supervisors using text chat.
- **Cisco Agent Desktop Supervisor.** The module providing supervisor capabilities, including the ability to view logged on agents and their current call status, as well as the ability to communicate with agents using text chat and via marquee messages.

### Cisco Agent Desktop Server

- Directory Services
- Cisco Agent Desktop Enterprise Server
- Cisco Agent Desktop Call/Chat Server
- Cisco Agent Desktop Administration, which includes:
  - Cisco Agent Desktop Administrator
  - Cisco Agent Desktop Enterprise Administrator
  - Cisco Agent Desktop Administrator documentation
  - Cisco Agent Desktop Agent installation program
  - Cisco Agent Desktop Supervisor installation program

- Cisco Unified ICM Administration Client

## Documentation

The Cisco CTI OS CD includes the following manuals:

- *CTI Product Description Guide for Cisco Unified ICM/Contact Center Enterprise & Hosted*
- *CTI OS System Manager's Guide for Cisco Unified ICM/Contact Center Enterprise & Hosted*
- *CTI OS Developer's Guide for Cisco Unified ICM/Contact Center Enterprise & Hosted*
- *CTI OS Agent Desktop User Guide for Cisco Unified ICM/Contact Center Enterprise & Hosted*
- *CTI OS Supervisor Desktop User Guide for Cisco Unified Contact Center Enterprise & Hosted*
- *CTI Driver for Siebel 7 Reference Guide for Cisco Unified ICM/Contact Center Enterprise & Hosted*
- *Release Notes for Cisco CTI OS Release 8.0(1)*

## Support and Training

Contact your Cisco sales representative for information on availability and pricing of support and training.



## CHAPTER 2

# Cisco CTI Server Software

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This chapter introduces Cisco CTI Server and provides an overview of the ways in which CTI clients can work together with the CTI Server and Unified ICM. It includes the following:

- Description of the Cisco Unified ICM and the way that Cisco CTI fits in with Unified ICM.
- Description of various CTI Server configurations.

## Cisco CTI Server

Cisco CTI Server is the basic server component of Cisco CTI, which enables Unified ICM to deliver agent, call, and customer data in real-time to a server and/or workstation application as events occur throughout the life of a call. The CTI Server is a software process that runs on a Peripheral Gateway (PG) machine. It is the CTI gateway into Unified ICM's data and services.

- Pre-route indications identify a caller and provide associated attributes to applications while the call is still in the public or private network and before the caller is connected to an agent, Web server or IVR.
- Call events are provided throughout all stages of the call flow, from the moment a call arrives at an answering location (ACD, PBX, IVR, Web server) until the caller hangs up.
- Agent work state changes are reported as they occur.

The system's full third-party call control features allow agents and integrated desktop or server applications to perform such phone-control tasks as transfer, conference and set call data, all within an enterprise framework. Data collected by an agent at the desktop can be transferred among agents across multi-vendor switches, allowing customer and transaction data to accompany a call from the IVR or Web server to the agent, and from site-to-site, as required. This capability increases the efficiency of a virtual call center workforce by eliminating time spent verbally soliciting information that should already be available.

You may write to the CTI Server directly. However, first consider one of the Cisco provided application-directed offerings (e.g., CTI OS Toolkit).

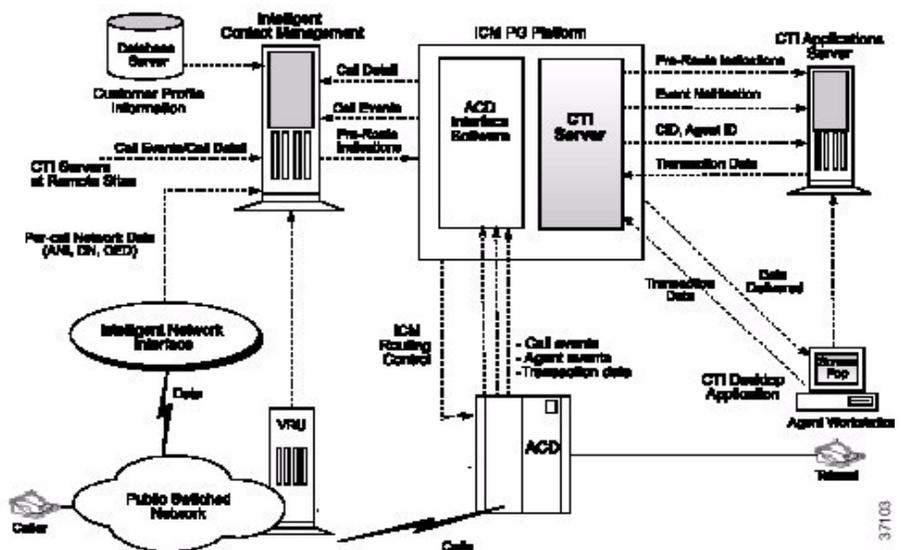
Refer to the *Cisco Unified ICM CTI Server Message Reference Guide* for more information about the CTI Server.

## The CTI Server, CTI Clients, and Unified ICM

Unified ICM is central to Cisco's overall call center routing solution. The Cisco CTI Server is the heart of Cisco's CTI. This section gives an overview of how they fit together.

The CTI Server provides an interface between Intelligent Contact Management software and client CTI applications so that these applications can make use of the enterprise wide routing data managed by Unified ICM. The CTI Server runs at the call center site on an Unified ICM Peripheral Gateway (PG) with ACD interface software. [Figure 2-1](#) shows a sample Cisco CTI system. CTI Servers may be running at one or several call centers in the enterprise.

**Figure 2-1** CTI Server Overview



The two most common CTI-enabled applications are screen-pop integrations and third-party control applications.

In a screen-pop integration, the CTI Server sends call flow events to the application (either on a dedicated application server or on an agent's desktop); the application interprets these call flow events to retrieve call context data. This call context data is used to either pre-populate the screens on an agent's workflow application (for example, a CRM application) or to record work events (for example, calls and agent states) into a workforce management system.

In a third-party control application, the CTI Server accepts commands that are in turn passed on through the PG and to the ACD to which it is connected. For example, a common third-party control application is a softphone, which enables the agent to control their telephone set via their computer. This is especially useful when the softphone application can be integrated with the agent's workflow application, and can take advantage of integration features such as call wrap-up data, call context (data) transfer on consultation calls, and application-driven speed-dial lists.

**Note**

In the case of a CTI Bridge (All Devices) application, the application must deliver the event information to the desktop. See the [“CTI Server Application Models” section on page 2-6](#).

## Network-to-Desktop CTI

An additional feature of Unified ICM (as compared to other CTI middleware products), is the ability of Unified ICM to forward pre-route indications to CTI application servers. Pre-route indications identify the caller and provide associated call attributes to applications while the call is still in the public or private network (that is, before the call is connected to an agent or internal IVR/VRU).

Unified ICM gets the network call data (ANI, DNIS, CED...) and any call profile data (from a database lookup) at the time that it is processing route requests. When Unified ICM returns the routing label to the network, it simultaneously passes this destination information down to the CTI Server. This permits a CTI client application time to do a pre-fetch of the appropriate database record, allowing for an extremely quick screen pop when the agent ultimately receives the call.

In the case of a desktop CTI client, call event information is automatically delivered to the targeted agent's desktop when the call is delivered. CTI Server reports call events and agent work state changes to the application as they occur through each stage of the call flow, from the moment a call arrives at an answering resource (ACD, PBX, IVR, Web server), until the caller hangs up.

## Unified ICM Call Processing

The following brief overview of several different examples of Unified ICM call processing flows may be helpful when considering the CTI services and data provided by this interface. In the following discussion, *call data* refers to the user data associated with a specific call collected by Unified ICM. Call data may include ANI, DNIS, CED, and an array of Call Variables containing user-defined data.

### Pre-Routed Call

In this example, an incoming call is automatically routed.

1. A customer dials an “800” number.
2. The caller responds to in-network prompting (if any).
3. The network forwards a route request to Cisco Unified ICM (including any available call data).
4. Unified ICM, through the use of a routing script, chooses a destination to handle the call. The routing script almost certainly makes use of any CED.
5. A route response is returned to the network.
6. The call arrives at the chosen ACD and is monitored by the Cisco Peripheral Gateway (PG).

**Note**

The call can, in fact, go anywhere that the business rules tell it to go, not necessarily to the ACD. For example, it might go to an in-front-of-the-switch IVR.

7. The call may pass through several states (queued, alerting,...) before finally being connected to an IVR or agent.
8. The IVR or agent may either handle the call directly or transfer the call to another agent.

9. Upon completion of each call segment, Termination Call Detail records are created and sent to the Central Controller database.

## Translation Route Call



### Note

The reason for using a translation route call is so that data can be translated (that is, transported) to the ACD. In a pre-routed call, call data is used by Unified ICM in its decision making, but is not passed on to the ACD—let alone any data generated by the routing script.

1. A customer dials an “800” number.
2. The caller responds to in-network prompting (if any).
3. The network forwards a route request to Unified ICM (including any available call data).
4. Unified ICM, through the use of a routing script, chooses two destinations for the call: an intermediate target (Dialed Number) and an ultimate target (Agent/Agent Skill). The intermediate target is chosen from a special pool of targets reserved for just this purpose. No other calls are expected to arrive at the intermediate target.
5. A route response is returned to the network to send the call to the intermediate target. *At the same time, the ultimate target data is sent to the PG monitoring the ACD where the call is expected to arrive. CED collected in the network and any other call data set by the routing script is also sent to the PG in the message.*
6. The call arrives at the chosen ACD and is monitored by the Cisco Peripheral Gateway (PG).
7. The ACD, recognizing the intermediate target (special nature of the call), performs a Route Request to collect the call’s ultimate target.
8. The ultimate target and other call data determined by Unified ICM in step 5 is returned by the PG in a Route Response.
9. The ACD routes the call to the ultimate target (Skill/Agent). As in the pre-routed call case, the PG is informed of the call’s state changes as they occur. Eventually the call is connected to an IVR or agent.
10. The IVR or agent may either handle the call directly or transfer the call to another agent.
11. Upon completion of the call segments, Termination Call Detail records are created and sent to the Central Controller database.

## Post-Routed Call

In this example, a redirected call is automatically routed in the same way that an incoming call was pre-routed.

1. A routing client, such as an agent, ACD, IVR, or Web server, sends a Route Request to Unified ICM in order to determine the destination for a call it wishes to redirect. The Route Request may supply call data such as CED and any other call data that peripheral type supports.
2. Unified ICM, through the use of a routing script, chooses a destination to handle the call. The routing script almost certainly makes use of any CED.
3. A route response is returned to the ACD, along with call data (that may have been updated by the routing script).

4. The ACD routes the call to the ultimate target. As in the pre-routed call case, the ACD informs the PG of the call's state changes as they occur. Eventually the call is connected to an agent.
5. The agent may either handle the call directly or transfer the call to another agent.
6. Upon completion of the call, a Termination Call Detail record is created and sent to the Central Controller database.

## Transfer Call

1. In the case of a local transfer, the agent handling a call directs the ACD to transfer the call to another destination on the same ACD.
2. The ACD informs the PG of the various events associated with the call's transfer.
3. Call transfers are handled differently by different types of ACDs, but in general a new logical call is created for the resulting call, and a Termination Call Detail record is created for the original call.
4. The new call is connected to an agent and is subsequently handled or transferred (again) like any other call.

In the case of a remote transfer, the call leaves the realm of the monitoring PG and the original call is terminated in the usual way. If the remote transfer is to another ACD that is monitored by Unified ICM, the new call is monitored on that ACD's PG when the call arrives. Depending upon the particular ACD's capabilities and tie-line configuration, the ACDs may be set up to transfer calls using the post route and translation route features previously described. In this case, the call data is preserved by being sent through Unified ICM via the route request and translation route mechanisms to the remote PG, and is thus available to the CTI client, if any, associated with the destination device.

However, if the remote transfer does not use translation routing, the new (transferred) call has none of the call data of the original call.

## Conference Call

Like call transfers, call conferences are handled differently by different types of ACDs and may involve the creation of several calls that are all linked together.

# CTI Server Application Models

You can use either of two client models to integrate call center applications with Unified ICM: *agent workstation* or *CTI Bridge*.

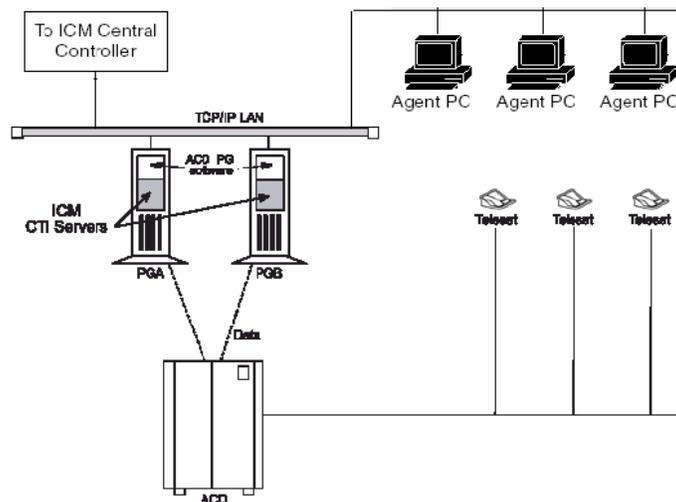
## Agent Workstation (Client Events) Application

In the agent workstation model, the client is an application running on a personal computer on an agent's desktop. This client is interested in the call data and call events related to a single agent teleset. The agent workstation application might also be interested in agent state changes.

Typically, when the agent workstation application is informed of an incoming call, it will likely use the call data collected by Unified ICM to retrieve caller-specific data from a database. This data is presented on the agent workstation screen at approximately the same time that the incoming call is connected to the agent.

While handling the call, the agent may wish to update some of the call data. For example, an agent who is processing an insurance claim may make some adjustments to the call data; an update ensures that the changes are not lost before the call is transferred to a second agent. Upon completion of the call, the client may be used by the agent to add call-specific wrap-up information to the Termination Call Detail record logged in the Unified ICM database. This wrap-up data may be a key value that can help locate more detailed transaction information in some other database. If the agent should conference with or transfer the call to another agent on the same ACD with a CTI client workstation, then that agent's CTI client also receives the incoming call data, including any updates made by the first agent. If the transfer or conference involves an agent on another ACD, the call data is provided to the remote CTI client if a translation route is used.

**Figure 2-2** CTI Agent Workstation Model



## CTI Bridge (All Devices) Application

CTI Bridge applications are interested in all call and agent state events that are configured in Unified ICM and the ACD, unlike agent workstation applications that are interested only in the events associated with an agent's teleset. The CTI Bridge application is a user-written program that converts or adapts some or all of the CTI Server messages into another format; a single CTI Bridge application provides such services for multiple agent desktops.

Some examples of CTI Bridge applications include:

- *Message converter applications.* For example, an application may convert the CTI Server message set to the message set of a foreign telephony server.
- *Server-to-server communication applications.* For example, an application may enable the CTI Server to speak directly to a help desk application's middle tier server.

In a CTI Bridge configuration, a CTI Bridge application provides the connection between an existing desktop CTI application and Unified ICM (see [Figure 2-3](#)—although only a single Bridge client is indicated in the figure, multiple clients at the agent's desktop are allowed).



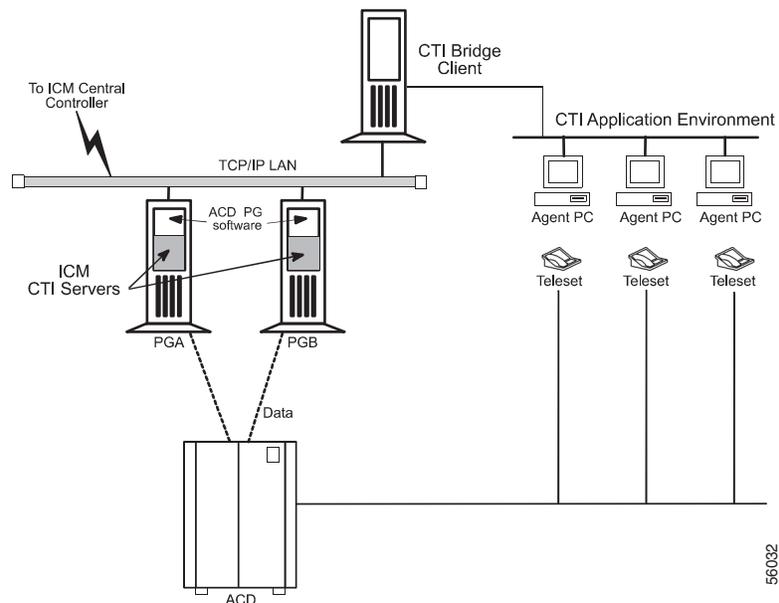
### Note

Most of the functionality found in the agent workstation (desktop) model is also available in the CTI Bridge application model. The CTI Bridge application lets you look at all events, and the agent workstation is a subset of all events. However, the CTI Bridge application must be written to support this functionality.

The pre-route indicators are not available for agent workstations.

CTI OS uses the CTI Bridge application model, providing an out-of-the-box platform for agents.

**Figure 2-3** CTI Bridge Model



# CTI Server Configurations

The Cisco CTI interface uses TCP/IP for network connectivity to the CTI Server. You can use the Ethernet interface used for CTI client communication with the CTI Server for other purposes, such as the PG's public network interface; a dedicated interface is not required.



**Note**

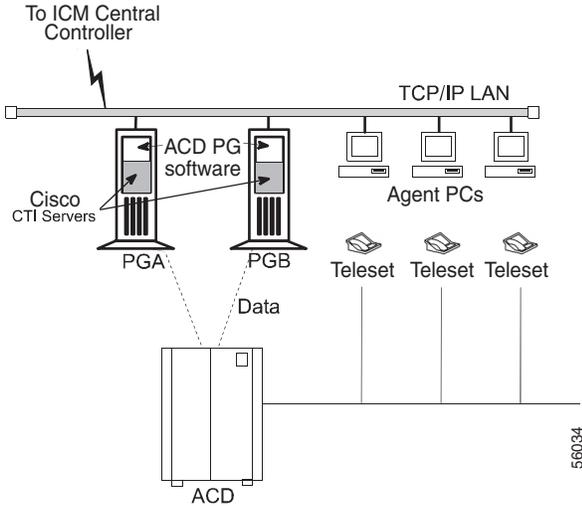
The private network between two sides of a logical PG pair is used for failover and data synchronization, and therefore should not be used for any CTI or other communication.

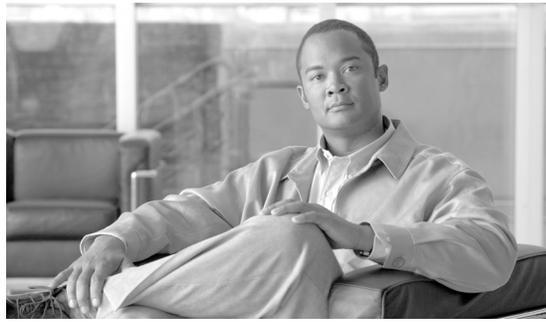
The following CTI Server configurations can be used in association with desktop clients, Bridge clients, or both.

## Simplex/Duplex Configuration

In *simplex* configurations, there is one CTI Server on the local network with the CTI clients. In *duplex* configurations, two CTI Servers are present. There may be other equipment (for example, ACDs) on the network as well. [Figure 2-4](#) shows a typical duplex configuration.

**Figure 2-4** Typical Duplex Configuration Environment





# CHAPTER 3

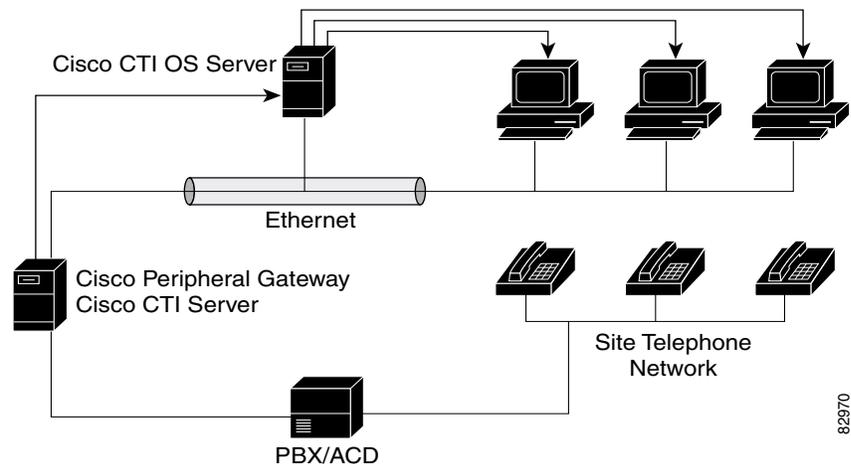
## Cisco CTI Object Server (CTI OS) Software

This chapter provides a description of the Cisco CTI Object Server (CTI OS) product offering.

### Overview of CTI OS

The CTI OS is Cisco's next generation customer contact integration platform. CTI OS combines a powerful, feature-rich server and an object-oriented software development toolkit to enable rapid development and deployment of complex CTI applications. Together with the Cisco CTI Server Interface, CTI OS Server and the CTI OS Client Interface Library (CIL), create a high performance, scalable, fault-tolerant three-tiered CTI architecture, as illustrated in [Figure 3-1](#).

**Figure 3-1** CTI OS Logical Three-Tiered Architecture Topology



The CTI OS application architecture employs three tiers:

- The CIL is the first tier, providing an application-level interface to developers.
- The CTI OS Server is the second tier, providing the bulk of the event and request processing and enabling the object services of the CTI OS system.
- The Cisco CTI Server is the third tier, providing the event source and the back-end handling of telephony requests.

For troubleshooting complications that arise as a result of the security feature, refer to the [CTI OS Troubleshooting Guide for Cisco Cisco Unified ICM/Contact Center Enterprise & Hosted](#).

## Cisco CTI Toolkit Agent Desktop

Cisco CTI Toolkit Agent Desktop provides an interface that enables agents to perform telephony call control and agent state control. The CTI Toolkit Agent Desktop provides an interface to allow call data to be presented to the agent in the form of a screen pop. The CTI Toolkit Agent Desktop also provides agents with statistics and chat capability.


**Note**


---

CTI OS only supports chat between agents on the same peripheral.

---

The CTI Toolkit Agent Desktop call controls include:

- Answer/Release
- Hold/Retrieve
- Transfer
- Conference;
- Makecall
- Alternate/Reconnect

The CTI Toolkit Agent Desktop agent state controls include:

- Login/Logout
- Ready/NotReady
- Wrap up


**Note**


---

Cisco CTI Toolkit Agent Desktop works with both IPCC and Time Division Multiplexing (TDM) switches. Refer to the *CTI OS System Manager's Guide for Cisco Unified ICM/Contact Center Enterprise & Hosted Editions* for details about supported switches.

---

Refer to the *CTI OS Agent Desktop User Guide for Cisco Unified ICM/Contact Center Enterprise & Hosted* for detailed information about how to use the CTI Toolkit Agent Desktop.

## Cisco CTI Toolkit IPCC Supervisor Desktop

The Supervisor Desktop has all of the functionality of the Agent Desktop, with additional functions for monitoring and managing Agent Team members.


**Note**


---

The CTI Toolkit IPCC Supervisor Desktop is supported for use on Cisco IPCC Enterprise *only*. It is *not* supported for use on TDM peripherals.

---

The additional capabilities of a supervisor include:

- Provide real-time agent status information of all agent team members supervised by the supervisor for all media (voice, e-mail, and web collaboration).
- Provide call information (call data and events) for an actively monitored agent.
- Support call monitoring features, including barge in, intercept, and silent monitoring of agents (see the next section).

- Support emergency and supervisor assist calls.
- Allow exchange of text messages between the supervisor and an agent team member (chat).
- Ability to change agent state of supervised agent to Logout, Ready and Not Ready.
- Enable supervisors to control their own states for receiving assist calls.
- Support for recording calls via third-party software.

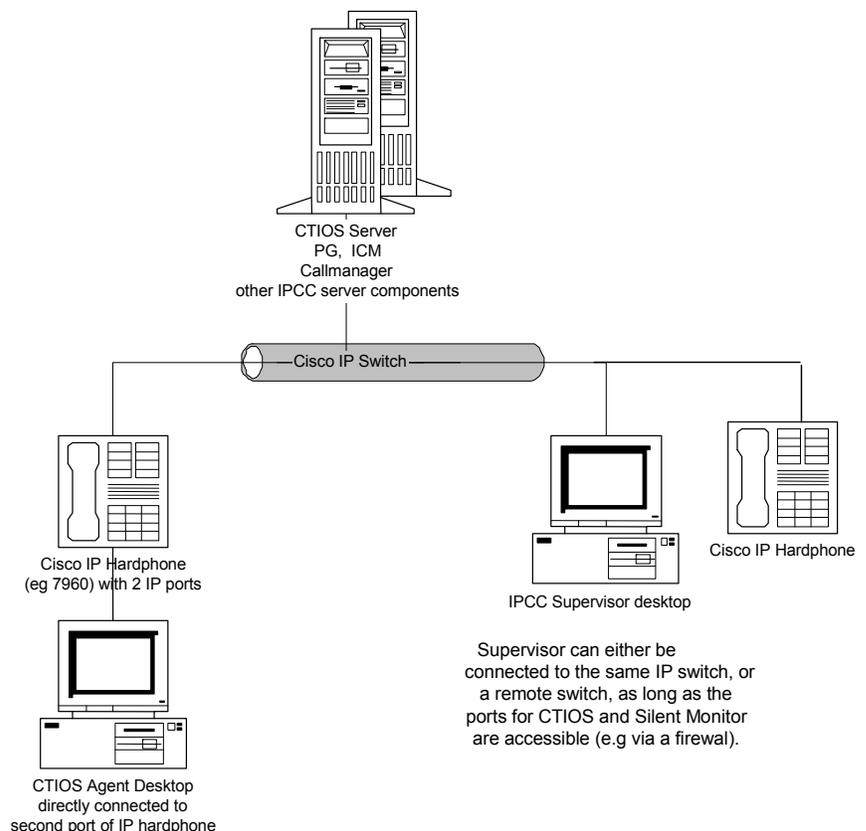
Refer to the *CTI OS Supervisor Desktop User Guide for Cisco Unified Contact Center Enterprise & Hosted* for detailed information about how to use the CTI Toolkit IPCC Supervisor Desktop.

## Silent Monitor

Silent Monitor provides a supervisor with a means to listen in on agent calls in IPCC call centers that use CTI OS. Supervisors can send Silent Monitor requests to agent desktops without the agent being aware of any monitoring activity. Voice packets sent to and received by the monitored agent's IP hard phone are captured from the network and sent to the supervisor desktop. At the supervisor desktop, these voice packets are decoded and played on the supervisor's system sound card.

The necessary network topology is shown in [Figure 3-2](#).

**Figure 3-2** Silent Monitor Network Topology



Agents in this topology may have an IP hard phone. (The supervisor in this topology must have an IP hardphone.) If the agent has an IP hard phone, it must have an agent desktop PC connected to the second IP port. If the agent has IP Communicator, it must be installed on the same machine as the agent desktop.

A CTI OS based desktop application that implements the CTI OS Silent Monitor feature must be installed on the agent desktop and supervisor desktop PCs.

See the *CTI OS System Manager's Guide for Cisco Unified ICM/Contact Center Enterprise & Hosted* for instructions on how to install and configure Silent Monitor, and the *CTI OS Supervisor Desktop User Guide for Cisco Unified Contact Center Enterprise & Hosted* for details on how to run Silent Monitor.

## CTI OS Server-Client Security

CTI OS provides for security of data that is transmitted between the CTI OS Server and CTI OS Client using the Transport Layer Security (TLS). This TLS protocol provides encryption and certification at the transport layer (TCP), so that data can flow through a secure channel without requiring significant changes to both CTI OS Client and CTI OS Server.



**Note**

---

JavaCIL and .NET CIL do not support Server-Client Security

---

## Multi-Tenancy/Multi-Instance CTI OS

The CTI OS Server supports multiple instances of itself running on the same physical server. Each instance listens and accepts new client connections on a unique TCP/IP port. This feature enables service providers to deploy the Unified CCE offering without the need for dedicated CTI OS servers for each of their customers.



**Note**

---

The support to multiple instances of the CTI OS Servers running on a single physical server is limited to Unified CCE only. This feature does not support any TDM ACDs or Siebel.

---

## Quality of Service (QoS)

The CTI OS Client and Server installation programs have been enhanced to provide for the Quality of Service (QoS). It is possible to enable or disable the QoS feature depending on your requirements.



**Note**

---

Siebel Driver will not support QoS. Likewise, the JavaCIL and .NET CIL do not support QoS.

---

## Cisco CTI Driver for Siebel 7

The Cisco CTI Driver for Siebel 7 interfaces the Siebel Enterprise Relationship Management application with Cisco's CTI products. The Cisco CTI Driver for Siebel 7:

- Provides seamless integration between Cisco and Siebel products.
- Supports Siebel toolbar, commands, and Siebel VB, escript. Agents can place, receive, conference, and transfer calls, including full context call transfer.
- Supports Siebel 7 releases which use the Siebel Communications server, including the Siebel Web client and mobile Web client.

- Passes data to the Siebel application for screen pop and Siebel VB, including ANI, DNIS, caller entered digits, call type, call placement, call variables, including expanded call context (ECC) variables.
- Enables Siebel developers to use Cisco commands and events to develop and enhance their applications.
- Provides integration with Cisco's Data Store.
- Provides agent and skill group statistics from a CTI OS Server with a broadcast display in Siebel.
- Provides support for the Outbound Option.

## Test Environment

The CTI OS Software Development Toolkit (SDK) CD media includes a *CTIServerSimulator* that can be used for application development and demo purposes. It has the capability to roughly simulate an Avaya PBX/ACD or Unified CCE environment. Documentation on how to configure and use the simulator can be found in the directory called **CTI Server Simulator** under the **CTIOS Tools** install directory.



### Note

This simulator is *only* appropriate for preliminary testing of client applications. Because it does not fully replicate the behavior of the actual switch environment, the simulator should not be used for any type of QA testing. To ensure proper design conformance and ensure the correctness of the application, the CTI application *must* be tested with the actual telephony environment in which it will run. This enables the event flow and third-party control components, which are driven by the switch- and implementation-specific call flow, to be properly and thoroughly tested.

## Using the Samples

The CTI OS Software Development Toolkit (SDK) is distributed with a rich set of sample applications on the CD media. These samples demonstrate several working applications that use the CTI OS Client Interface Library API. The samples are organized by programming language and demonstrate the syntax and usage of the API, as well as “real-world” uses of the CIL API to build applications.

For many developers, these samples will form the foundation of your custom application. The samples are available for you to customize and distribute as part of your finished product.

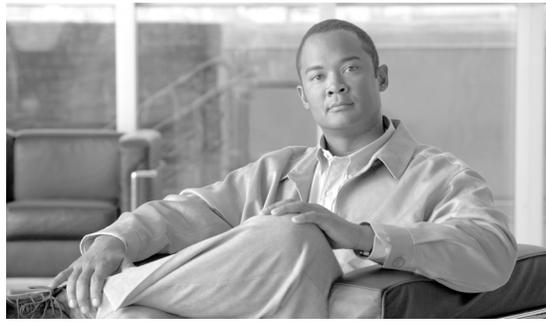


### Note

The CTI Toolkit Combo Desktop (.NET) sample is a fully functional desktop illustrating basic agent functionality as well as supervisor and outbound. That sample when used in conjunction with the Developer's Guide provides the most comprehensive and recommended implementation of a custom CTI application and it can be used as a best practices implementation for any language.

Refer to the *CTI OS Developer's Guide for Cisco Unified ICM/Contact Center Enterprise & Hosted* and the CTI OS Software Development Toolkit for more details.





## CHAPTER 4

# Cisco Agent Desktop (CAD) Software

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This chapter provides a description of the Cisco Agent Desktop (CAD) product offering.

## Cisco Agent Desktop

Cisco Agent Desktop is a client-server application providing out-of-the-box CTI functionality for Unified CCE. Cisco Agent Desktop Server processes may be installed on a Peripheral Gateway co-resident with CTI OS or may reside on a dedicated hardware platform. Also included is Cisco Agent Desktop, a desktop-installed, thick client to Agent Desktop Server. Cisco Agent Desktop provides out-of-the box functionality at the desktop, including:

- Softphone toolbar, providing full third-party call control and agent state control
- Customer-defined workflow automation via task buttons
- Screen pops generated by telephony events that execute using keystroke macros
- Agent-to-agent text chat
- Agent-to-supervisor text chat

The key advantage of Agent Desktop is its ability to be deployed rapidly, realizing the benefits of CTI more quickly and with fewer requirements for professional services or customization. The trade-off for rapid deployment is less flexibility in the CTI application.

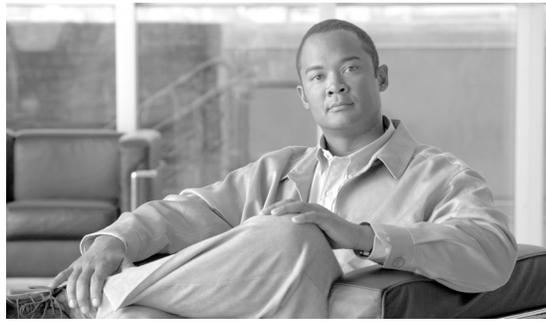
The Cisco Agent Desktop solution is ideal for customers who:

- Utilize a Windows desktop that is not browser based
- Want to spend minimal effort and time on CTI services deployment
- Want to avoid exposure to the uncertainties of custom CTI development
- Desire the ability to configure, but not customize, the softphone
- Require screen pop or other desktop workflow automation

For more information, refer to the Cisco Agent Desktop documentation at

<http://www.cisco.com/univercd/cc/td/doc/product/icm/icmentpr/icm46doc/ipccdoc/cadall/index.htm>





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