Cisco ICM Software CTI Product
Description
Cisco CTI Release 6.0(0)
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About This Guide

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 Intelligent Contact Management (ICM) software.

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 Intelligent Contact Management (ICM) software; however, a knowledge of ICM software is necessary for implementing Cisco CTI.

Refer to the Cisco ICM Software Product Description guide for an introduction to ICM software.

Organization

The following table describes the information contained in each chapter of this guide.
# About This Guide

This manual provides information on the Cisco ICM Software CTI Product Description Release 6.0(0).

## Conventions

This manual uses the following conventions:

### Format

<table>
<thead>
<tr>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boldface type is used for user entries, keys, buttons, and folder and submenu names.</td>
<td>Choose <strong>Script &gt; Call Type Manager</strong>.</td>
</tr>
</tbody>
</table>
| Italic type indicates one of the following: | • A newly introduced term  
• For emphasis  
• A generic syntax item that you must replace with a specific value  
• A title of a publication  
• A skill group is a collection of agents who share similar skills.  
• *Do not* use the numerical naming convention that is used in the predefined templates (for example, `persvc01`).  
• IF *(condition, true-value, false-value)*  
• For more information, see the *Cisco ICM Software Database Schema Handbook*.  |
| An arrow (>) indicates an item from a pull-down menu. | The Save command from the File menu is referenced as **File > Save**. |

## Chapter Description

- **Chapter 1, “What is CTI?”** 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.
- **Chapter 2, “Cisco CTI Server Software”** Provides an overview of the ways in which CTI clients can work together with the CTI Server and ICM software.
- **Chapter 3, “Cisco CTI Object Server (CTI OS) Software”** Describes the CTI OS software components that are contained in Cisco CTI.
- **Chapter 4, “Cisco CTI Desktop Software”** Describes the CTI Desktop software components that are contained in Cisco CTI.
- **Chapter 5, “Cisco Agent Desktop (CAD) Software”** Describes the Cisco Agent Desktop (CAD) software components that are contained in Cisco CTI.
Other Publications

For additional information about Cisco Intelligent Contact Management (ICM) software, see the Cisco web site listing Customer Contact Center documentation.

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation on the World Wide Web at this URL:

http://www.cisco.com/univercd/home/home.htm

You can access the Cisco website at this URL:

http://www.cisco.com

International Cisco websites can be accessed from this URL:


Ordering Documentation

You can find instructions for ordering documentation at this URL:


You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Ordering tool:

• Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

Documentation Feedback

You can submit e-mail comments about technical documentation to bug-doc@cisco.com.

You can submit comments by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

For all customers, partners, resellers, and distributors who hold valid Cisco service contracts, the Cisco Technical Assistance Center (TAC) provides 24-hour-a-day, award-winning technical support services, online and over the phone. Cisco.com features the Cisco TAC website as an online starting point for technical assistance. If you do not hold a valid Cisco service contract, please contact your reseller.

Cisco TAC Website

The Cisco TAC website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The Cisco TAC website is available 24 hours a day, 365 days a year. The Cisco TAC website is located at this URL:

http://www.cisco.com/tac
Accessing all the tools on the Cisco TAC website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a login ID or password, register at this URL:


## Opening a TAC Case

Using the online TAC Case Open Tool is the fastest way to open P3 and P4 cases. (P3 and P4 cases are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Case Open Tool automatically recommends resources for an immediate solution. If your issue is not resolved using the recommended resources, your case will be assigned to a Cisco TAC engineer. The online TAC Case Open Tool is located at this URL:

http://www.cisco.com/tac/caseopen

For P1 or P2 cases (P1 and P2 cases are those in which your production network is down or severely degraded) or if you do not have Internet access, contact Cisco TAC by telephone. Cisco TAC engineers are assigned immediately to P1 and P2 cases to help keep your business operations running smoothly.

To open a case by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)
EMEA: +32 2 704 55 55
USA: 1 800 553-2447

For a complete listing of Cisco TAC contacts, go to this URL:


## TAC Case Priority Definitions

To ensure that all cases are reported in a standard format, Cisco has established case priority definitions.

Priority 1 (P1)—Your network is “down” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.
Priority 2 (P2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Priority 3 (P3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Priority 4 (P4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- Cisco Marketplace provides a variety of Cisco books, reference guides, and logo merchandise. Go to this URL to visit the company store:
  http://www.cisco.com/go/marketplace/

- The Cisco Product Catalog describes the networking products offered by Cisco Systems, as well as ordering and customer support services. Access the Cisco Product Catalog at this URL:
  http://cisco.com/univercd/cc/td/doc/pcat/

- Cisco Press publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press online at this URL:
  http://www.ciscopress.com

- Packet magazine is the Cisco quarterly publication that provides the latest networking trends, technology breakthroughs, and Cisco products and solutions to help industry professionals get the most from their networking investment. Included are networking deployment and troubleshooting tips,
configuration examples, customer case studies, tutorials and training, certification information, and links to numerous in-depth online resources. You can access Packet magazine at this URL:
http://www.cisco.com/packet

• *iQ Magazine* is the Cisco bimonthly publication that delivers the latest information about Internet business strategies for executives. You can access iQ Magazine at this URL:
  http://www.cisco.com/go/iqmagazine

• *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:
  http://www.cisco.com/ipj

• Training—Cisco offers world-class networking training. Current offerings in network training are listed at this URL:
What is CTI?

This chapter provides a context in which to 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 CTI-enabled application is one in which the software used by the agent to service a customer request is driven by information generated by 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 CTI OS. The complete set of events available for CTI developers is detailed in later chapters in this 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

This somewhat 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 ICM software 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 Intelligent Contact Management (ICM) software.

Cisco CTI consists of:

- ICM software
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 OS Agent Desktop** and **CTI OS Supervisor Desktop for IPCC Enterprise**. These products provide a desktop for agents or supervisors to answer and process calls.

- Developer’s Toolkit: The CTI OS Toolkit 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 *Cisco ICM Software CTI OS Developer’s Guide* addresses the CTI OS Client Interface Library API for the C++, COM, Visual Basic, 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 *Cisco ICM Software CTI Driver for Siebel 7 Reference Guide* for detailed information.

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

Refer to the *Cisco ICM Software CTI OS Agent Desktop User Guide* and the *Cisco ICM Software CTI OS Supervisor Desktop for IPCC Enterprise User Guide* for more information about these products.

- **Cisco CTI Desktop**. An earlier version CTI package for use in developing applications. This product includes:

  - **CTI Desktop Softphone**. A fully functional, out-of-the-box desktop.

  - **Softphone Controls**. Lightweight ActiveX objects that allow you to embed desktop functionality in any valid host container application or to customize the existing CTI Desktop Softphone by simply using drag-and-drop and property pages.

  - **Desktop Control Server (DCS)**. An out-of-process (.EXE) COM server in which CTIClient is embedded.

  - **CTIClient**. An in-process (.DLL) ActiveX server that sits between the client application and the CTI Server.
- **JavaClient.** A set of Java classes that sits between the Java application/applet and the CTI Server—the Java equivalent of CTIClient.

- **CTI Driver for Siebel 6.** Driver that interfaces the Siebel eBusiness Applications application with Cisco’s CTI products. It is designed to operate at the desktop and uses Cisco’s Desktop Control Server (DCS) driver for telephony control. The DCS driver uses Cisco’s CTI Server. Refer to the *Cisco ICM Software CTI Driver for Siebel 6 Reference Guide* for detailed information.

**Note**
CTI Desktop, JavaClient, and the CTI Driver for Siebel 6 products were developed for Cisco CTI Releases 4.7 and earlier only. The 4.7 versions of these products work with ICM 6.0.


- **IPCC Media Termination.** The component that provides a soft alternative to the IP hard phone. It resides on the user’s PC and when used in conjunction with a PC soundcard, speakers, and microphone, the IPCC media termination component transmits and receives audio over an IP connection.

**Note**
This product is available either with CTI Desktop or with CTI OS.

For CTI OS users, refer to the *Cisco ICM Software CTI OS System Manager’s Guide* for more information about IPCC Media Termination.

For CTI Desktop users, refer to the *Cisco ICM Software CTI Programmer’s Guide* for more information about IPCC Media Termination.

- **Cisco 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.

See Chapter 5, “Cisco Agent Desktop (CAD) Software” for more information. Refer to the Cisco Agent Desktop documentation for detailed information about using this product.
Software

The two Cisco CTI CDs contain the following 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, or Java.

**Note** The products on this CD have been developed for Cisco CTI Releases 4.7 and later.

**CTI Desktop, JavaClient, and the CTI Driver for Siebel 6 CD**

- CTI Desktop Toolkit
- JavaClient
- CTI Driver for Siebel 6

**Note** CTI Desktop, JavaClient, and the CTI Driver for Siebel 6 products have been developed for Cisco CTI Releases 4.7 and earlier. The Release 4.7 versions of these products work with ICM Release 6.0.

**Cisco Agent Desktop Agent**

**Note** This product’s software is included on a separate Cisco CAD CD.

- **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 ICM Client Admin Workstation

**Documentation**

The Cisco CTI OS CD includes the following manuals:

• *Cisco ICM Software CTI Product Description*

• *Cisco ICM Software CTI OS System Manager’s Guide*

• *Cisco ICM Software CTI OS Developer’s Guide*

• *Cisco ICM Software CTI OS Agent Desktop User Guide*

• *Cisco ICM Software CTI OS Supervisor Desktop for IPCC Enterprise User Guide*

• *Cisco ICM Software CTI Driver for Siebel 7 Reference Guide*
Introduction to Cisco CTI

- Cisco ICM Software CTI OS Troubleshooting Guide
- Release Notes

The Cisco CTI Desktop CD includes the following manuals:

- Cisco ICM Software CTI Product Description
- Cisco ICM Software CTIClient Reference Guide
- Cisco ICM Software CTI Driver for Siebel 6 Reference Guide
- Cisco ICM Software CTI Programmer’s Guide
- Cisco ICM Software CTI Server Message Reference Guide

There are five versions of this guide on the Cisco CTI Desktop CD.


- Cisco ICM Software Desktop Control Server Reference Guide
- Cisco ICM Software JavaClient Reference Guide
- Cisco ICM Software Softphone Controls Reference Guide
- Release Notes

Support and Training

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

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 ICM software. It includes the following:

- Description of the Cisco Intelligent Contact Management (ICM) software and the way that Cisco CTI fits in with ICM software.
- Description of various CTI Server configurations.

Cisco CTI Server

Cisco CTI Server is the basic server component of Cisco CTI, which enables ICM software 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 either on a Peripheral Gateway (PG) or on a CTI Gateway (CG) machine. It is the CTI gateway into ICM software’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 ICM Software CTI Server Message Reference Guide for more
information about the CTI Server.

The CTI Server, CTI Clients, and ICM Software

Cisco Intelligent Contact Management (ICM) software 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 ICM software. The CTI Server runs
at the call center site on either an ICM Peripheral Gateway (PG) with ACD
interface software or on a dedicated CTI Gateway (CG) platform. Figure 2-1
shows a sample Cisco CTI system in which the CTI Server runs on a PG platform
along with the ACD interface software. CTI Servers may be running at one or
several call centers in the enterprise.
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.
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 2-8.

**Network-to-Desktop CTI**

An additional feature of ICM software (as compared to other CTI middleware products), is the ability of ICM software 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).

ICM software gets the network call data (ANI, DNIS, CED, etc.) and any call profile data (from a database lookup) at the time that it is processing route requests. When ICM software 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.

**ICM Call Processing**

The following brief overview of several different examples of 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 ICM software. 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 ICM software (including any available call data).
4. ICM software, 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 ICM software 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 ICM software (including any available call data).

4. ICM software, 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 ICM software 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 ICM software 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. ICM software, 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 ICM software, 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 ICM software 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 ICM software: 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 ICM software 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 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.

Note

CTI Desktop and Cisco Agent Desktop only support this model.
CTI Bridge (All Devices) Application

CTI Bridge applications are interested in all call and agent state events that are configured in ICM software 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 ICM software (see Figure 2-3—although only a single Bridge client is indicated in the figure, multiple clients and the agent’s desktop are allowed).
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 both agents and server-to-server integrations.

**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.
Combined/Separate PG/CTI Server Configuration

In configurations where the ICM Peripheral Gateway (PG) computer has sufficient CPU and memory resources, the CTI Server may be installed on the PG, as shown in Figure 2-4—thus combining the CTI Server and PG software on the same machines. In most cases, this is the recommended configuration.

In certain cases, the PG software and the CTI Server may be installed on separate machines, as shown in Figure 2-5.
CTI Server is distributed as part of the ICM software CD.
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 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 the CTI OS Client Interface Library (CIL) create a high performance, scalable, fault-tolerant three-tiered CTI architecture, as illustrated in Figure 3-1.
Overview of CTI OS

3-2

Figure 3-1  CTI OS Three-Tiered Architecture Topology

Note

The CTI OS Server can also run on the PG, but in larger configurations it may be necessary to have the CTIOS Server reside on its own dedicated machine.

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.

Cisco CTI OS Agent Desktop

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

The CTI OS Agent Desktop call controls include:
- Answer/Release
- Hold/Retrieve
- Transfer
- Conference
- Makecall
- Alternate/Reconnect

The CTI OS Agent Desktop agent state controls include:
- Login/Logout
- Set ready
- Ready/NotReady
- Wrap up

The Media Termination softphone is an option if hard phones are not desired, but the functionality is limited to a single line/extension. Refer to the Cisco ICM Software IP Contact Center Installation Guide for more information about softphone controls.

Note
Cisco CTI OS Agent Desktop works with both IPCC and Time Division Multiplexing (TDM) switches. Refer to the Cisco ICM Software CTI OS System Manager's Guide for details about supported switches.

Refer to the Cisco ICM Software CTI OS Agent Desktop User Guide for detailed information about how to use the CTI OS Agent Desktop.

Cisco CTI OS Supervisor Desktop for IPCC Enterprise

The Supervisor Desktop has all of the functionality of the Agent Desktop, with additional functions for monitoring and managing Agent Team members.
The CTI OS Supervisor Desktop for IPCC Enterprise 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, email, and web collaboration).
- Provide call information (call data and events) of 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 one of the agent team members or all agent team members (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 Cisco ICM Software CTI OS Supervisor Desktop for IPCC Enterprise User Guide for detailed information about how to use the CTI OS Supervisor Desktop for IPCC Enterprise.

**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 or media termination device 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.
Agents in this topology may have either an IP hard phone or IPCC Media Termination. (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 IPCC Media Termination, 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. In addition, CTI OS Silent Monitor software must be installed on the agent desktop and supervisor desktop PCs.

**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 and greater 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.

**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 a Avaya PBX/ACD or a Cisco IPCC environment. Documentation on how to configure and use the simulator can be found on the CTI OS CD in the directory Tools\Simulator.
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.

Refer to the Cisco ICM Software CTI OS Developer’s Guide and the CTI OS Software Development Toolkit CD for more details.
Cisco CTI Desktop Software

CTI Desktop is an earlier version CTI package that consists of the following major components.

- CTIClient
- Desktop Control Server (DCS)
- Softphone Controls
- CTI Desktop Softphone

Note: CTI Desktop, JavaClient, and the CTI Driver for Siebel 6 products have been developed for Cisco CTI Releases 4.7 and earlier. The Release 4.7 versions of these products will work with ICM 6.0.

CTI Desktop supports client applications that meet the following requirements:

- Written in any language that supports the Microsoft Component Object Model (COM) binary interface. This includes low order languages (for example, Visual C++) and high order languages (for example, Visual Basic or PowerBuilder). Also supported is scripting performed within a host container application.
- Client applications can run on any platform that supports the OLE2 protocol (for example, Visual Basic or Internet Explorer).

Note: CTI Desktop requires that a client application must be a desktop application handling a single teleset. It cannot be a CTI Bridge application.
For full information on CTI Desktop and its associated components see the *Cisco ICM Software CTI Product Description* for CTI Release 4.6, available on the Cisco website at 
Cisco Agent Desktop (CAD) Software

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 Cisco ICM/IPCC. This application includes Cisco Agent Desktop Server, an all events client of Cisco CTI Server. 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 (switch specific)
- 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 smaller 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 elapsed 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 soft phone
- 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/ipcedoc/cadall/index.htm
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