



CTI Planning

Cisco CTI software provides an interface between the Unified ICM software and agent desktop and server applications. The CTI software works with a Peripheral Gateway's ACD and VRU interface software and associated ACDs to track call events and transactions and forward call- and transaction-related data to an agent's desktop computer.

Pre-installation planning for CTI involves several tasks:

- Review CTI Server communications and platform options.
- Become familiar with the desktop options available with CTI Server.
- Estimate CTI message traffic.
- Plan fault tolerance for the CTI Server.
- Review ACD support for client control and third-party call control.

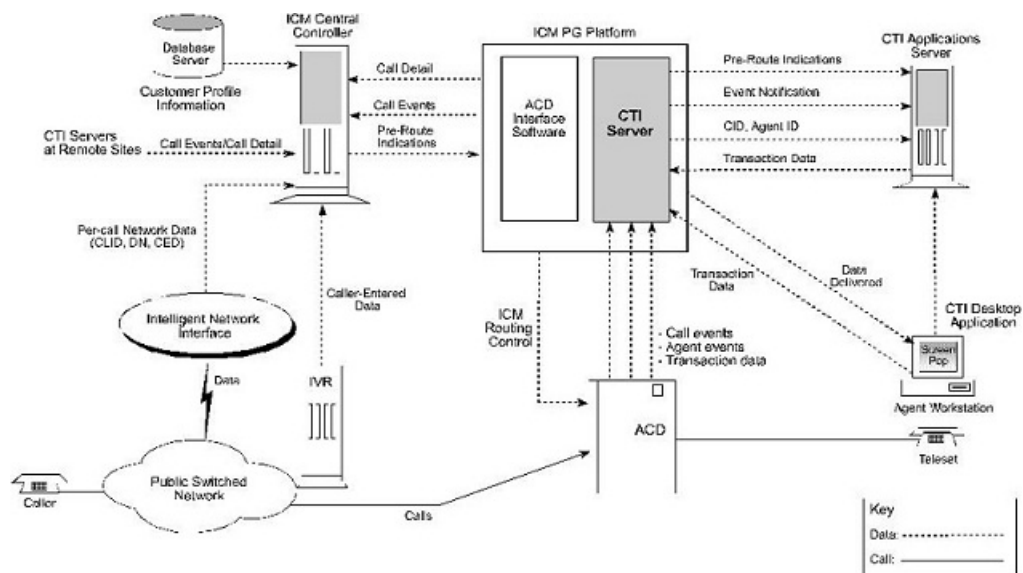
- [CTI Server, on page 1](#)
- [CTI Server Client Application Models, on page 5](#)
- [CTI Server Network and Database Planning, on page 6](#)
- [CTI Server Messages, on page 7](#)
- [Third-Party Call Control, on page 9](#)
- [ACD Support for Client and Third-Party Call Control, on page 10](#)

CTI Server

CTI Server, the basic server component of Cisco CTI, enables the Unified 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 on a Peripheral Gateway (PG). It is the CTI gateway into the Unified ICM software's data and services.

The following figure shows a sample CTI Server system. CTI Servers may be running at one or several call centers in the enterprise.

Figure 1: CTI Server Overview



One function of the CTI Server is to forward pre-route indications to CTI application servers. Pre-route indications identify the caller and provide CTI applications with other call attributes while the call is still in the public or private network (that is, before the call is connected to an agent or IVR resource).

CTI Server also reports call events and agent work state changes as they occur through each stage of the call flow—from the moment a call arrives at an answering resource (ACD, PBX, IVR), until the caller hangs up. In a desktop application environment, call event information is delivered to the targeted agent desktop at the same time the call is delivered.

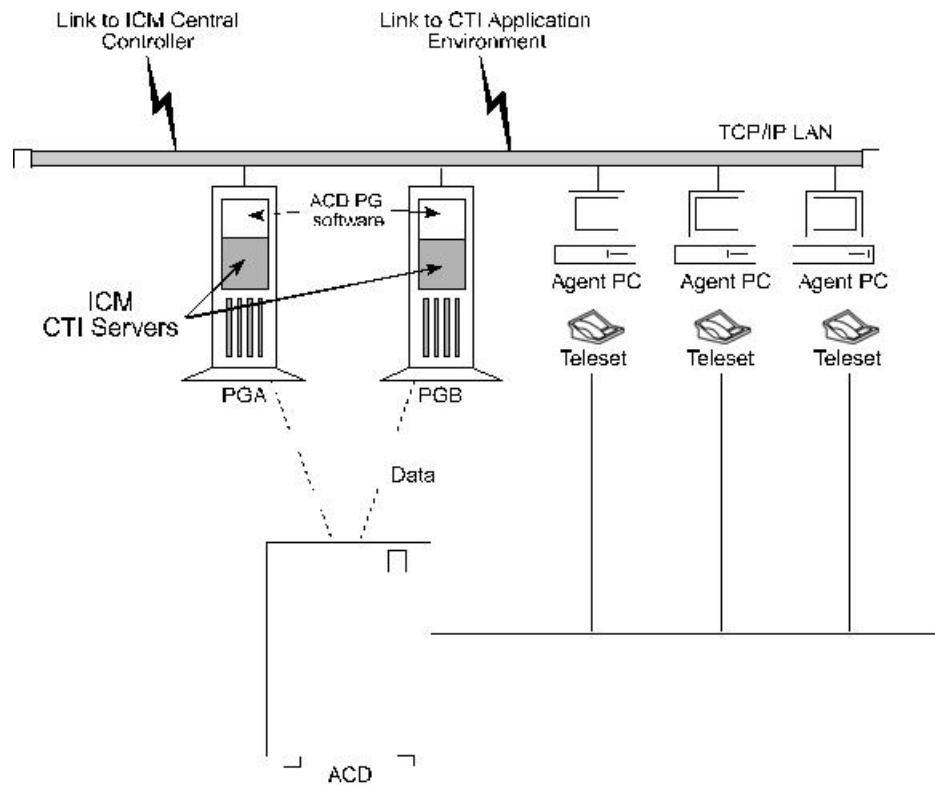
CTI Server Communications

The CTI Server uses TCP/IP Ethernet for communication with clients. You can use multi-protocol IP routers to provide connectivity to clients on other types of LANs. You can use the same LAN for the Peripheral Gateway's visible network interface and for CTI client-to-server communications.

CTI Server Platform Options

The CTI Server runs on a machine that is also running a Cisco ACD (or VRU) PG process. The shared platform option is shown in the following figure.

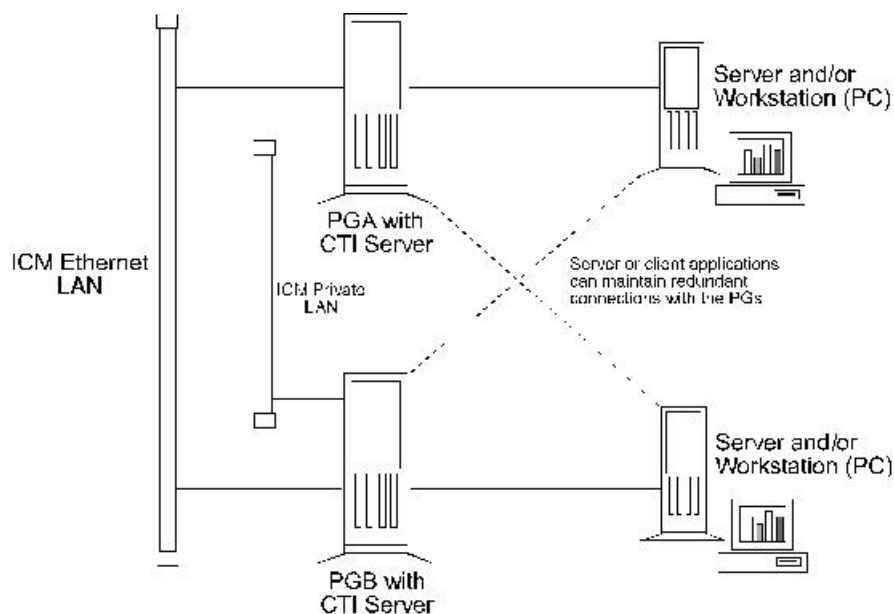
Figure 2: Shared CTI Server Platform



CTI Server Fault Tolerance

You can implement the CTI Server in a duplexed, fully fault-tolerant configuration. In a duplexed configuration, the CTI Server is installed on a pair of server platforms. In the event of a failed CTI client connection, the client process can automatically reestablish a connection to either side of the duplexed CTI Servers. The call's CTI client history list and any updates to call variables remain in effect when the connection is reestablished. The following figure shows a duplexed CTI Server configuration.

Figure 3: Duplexed CTI Server



Cisco CTI Object Server (CTI OS)

CTI Object Server (CTI OS) is a high-performance, scalable, fault-tolerant server-based solution for deploying CTI applications. CTI OS serves as a single point of integration for third-party applications, including Customer Relationship Management (CRM) systems, data mining, and workflow solutions.

Configuration data is managed at the server, which helps simplify customization, updates, and maintenance of CTI applications. You can access and manage servers remotely. Thin-client and browser-based applications that do not require Cisco software on the desktop can be developed and deployed with CTI OS.

CTI OS incorporates the following major components:

- CTI OS Toolkit
- Client Interface Library
- CTI OS Combo Desktop for Agents and Supervisors

CTI OS is a client of CTI Server. It has a single all-events connection to Cisco CTI Server. In turn, CTI OS accepts client connections using session, agent, and call interfaces. These interfaces are implemented in .NET, COM, Java, C++, and C, allowing for a wide range of application development uses. The interfaces are used for call control, to access data values, and to receive event notifications.

For complete and current information about the number of agents supported for CTI OS and other configurations, see the Solution Design Guide for Cisco Unified Contact Center Enterprise at <http://www.cisco.com/c/en/us/support/customer-collaboration/unified-contact-center-enterprise/products-implementation-design-guides-list.html>. See Virtualization for Unified Contact Center Enterprise at http://www.cisco.com/c/dam/en/us/td/docs/voice_ip_comm/uc_system/virtualization/virtualization-unified-contact-center-enterprise.html for hardware requirements for Unified CCE virtualized systems.

For all installations, the CTI OS Server must be co-resident with the PG.

For more information on CTI OS, refer to the CTI OS document set.

CTI Server Client Application Models

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

Agent Workstation 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 teleaset. The agent workstation application can also be interested in agent state changes.

Typically, when the agent workstation application is informed of an incoming call, it uses the call data collected by the Unified ICM system 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 can update some of the call data. For example, an agent who is processing an insurance claim can 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 agent can use the client to add call-specific, wrap-up information to the Termination_Call_Detail record logged in the Unified ICM central database. This wrap-up data is a key value that can help locate more detailed transaction information in some other database. If the agent conferences with or transfers 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.

CTI Bridge Application

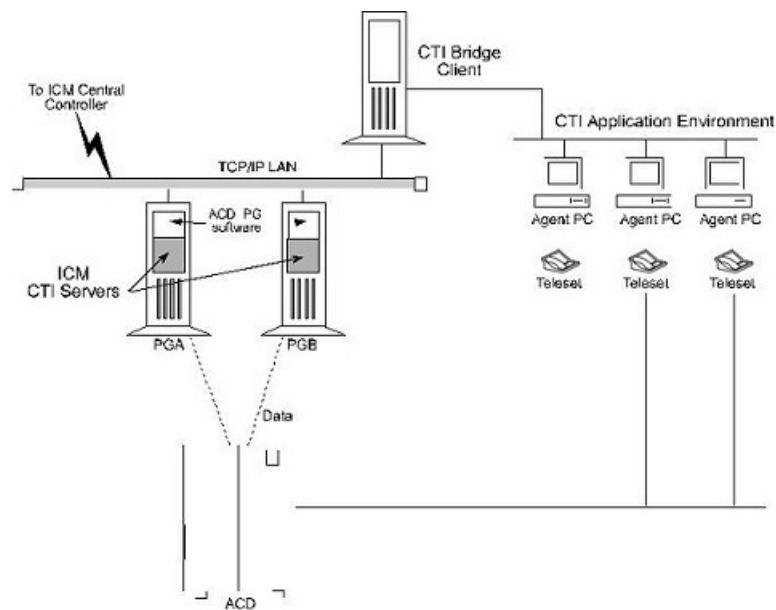
CTI Bridge applications are interested in all call and agent state events that occur on the ACD, unlike agent workstation applications that are interested only in the events associated with a particular teleaset. The CTI Bridge application is a user-written program that converts or adapts some or all of the CTI Server messages into another format; a single CTI Bridge application provides such services for multiple agent desktops. You can design the CTI Bridge application to interface with CTI Servers or similar applications on systems that are already in use in the call center.

Some examples of CTI Bridge applications include:

- Message converter applications. For example, an application can convert the CTI Server message set to the message set of a foreign telephony server.
- Server-to-server communication applications. For example, an application can 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 the Unified ICM.

Figure 4: CTI Bridge Model



Note All of the functionality found in the agent workstation (desktop) model is also available in the CTI Bridge application model. However, you must write the CTI Bridge application to support this functionality.

CTI Server Network and Database Planning

Some pre-installation planning is necessary to prepare your CTI desktop and network environment for the introduction of a CTI Server.

Network Topology

The machine running CTI Server connects to the CTI desktop environment via an Ethernet LAN. Therefore, the CTI desktop environment must reside on an Ethernet LAN. Other networks, such as Token-Ring, can require additional network hardware if you are connecting them to a CTI Server.

Network Security

Be sure that the CTI desktop environment IP routing scheme is compatible with the Unified ICM system and CTI Server. For example, if you have a firewall set up on the CTI environment LAN, you may need to change your system access setup or network configuration.

Software Distribution Strategy

If you are installing the CTIOS or CTI Desktop software components on multiple desktops, you must create a distribution strategy. For example, if you place the software on a centralized server and allow certain desktops within the enterprise to download the software, you must ensure that all sites have access to the centralized server.

Well-Known Port for CTI Server

A well-known port number identifies CTI Server as an application running in your intranet. All CTI clients, as well as the system administrator, must know this well-known port number. If you do not want to use CTI Server's default port numbering scheme, you can choose a well-known port number that fits into your overall network environment. You can use the Peripheral Gateway Setup to override the default port settings used to install the CTI Server PGs.

Fail-over Strategy for CTI Clients

Cisco CTI includes automatic fail-over and recovery mechanisms. Ensure that each CTI client has a clear and established network path to a CTI Server in case of a fail-over. For example, you may plan for each CTI client to have access to local and remote CTI Servers.

Database Strategy

You may have CTI applications that perform database queries to retrieve customer information for use in call processing. Some CTI applications acquire database records “pre-call” (that is, before the call arrives at an agent's desktop). Other applications query a database immediately after the call arrives at the agent's deskset. Plan a strategy for running database queries in the most efficient and timely manner possible.

CTI Server Messages

The CTI Server makes traffic call data available to applications in real time. To accomplish this task, the CTI Server responds to requests from clients and originates unsolicited messages. All messages share a common message header and use the same set of data types.

The table titled **CTI Server Message Categories** groups the messages into broad categories based on the nature of the message data.

Table 1: CTI Server Message Categories

Category	Description
Session Management	Messages related to the establishment and maintenance of a client connection to the CTI Server. These messages typically happen at client startup, shutdown, and during auto-recovery.
Miscellaneous	Messages related to system-level events on the PG (for example, peripheral offline, loss of PG-to-central controller communications).

Category	Description
Call Events	Messages related to call state changes.
Agent Events	Messages related to agent state changes.
Call Data Update	Messages related to CTI client modification of call data.
Client Control	Messages related to the direct control of agent state (for example, sign-in, sign-out) as well as control of inbound and outbound calls.

CTI Server imposes varying degrees of message traffic against the PG based on the specific call center and CTI application environment in which it is deployed. Document a typical call scenario in your CTI application environment, prepare for adequate bandwidth, and order the proper server platform.



Note For a description of the session management messages, see the latest version of the *CTI Server Message Reference Guide for Cisco Unified Contact Center Enterprise* for more information..

Typical Call Scenario

To estimate CTI Server message traffic, document a typical call scenario in your CTI application environment. The goal of this exercise is to account for all types of potential message traffic in the link between the CTI Server and the CTI application environment.

For example, you can handle a typical call as follows:

- The call is pre-routed.
- The call receives a call treatment such as a request to set call data.
- A simple call release, hold, transfer, or post-route request takes place.
- During this time an agent state may change (for example, from ready to work ready).

Message Load and Bandwidth

Ensure that you have enough bandwidth in the datacom connection to handle the message traffic between the CTI Server and the CTI application environment. For example, are you sure that a 56-Kbps connection is adequate for your environment?

The call scenario process helps you to estimate the message load and calculate how much bandwidth is required in the link between the CTI Server and the CTI application environment (for example, 56K, 256K, or more).

CTI Server Platform

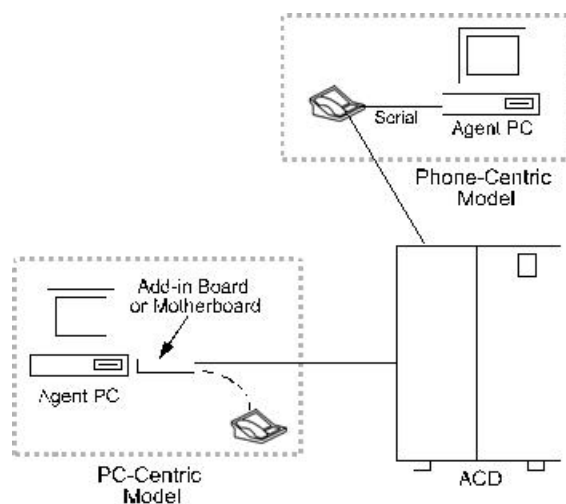
Ensure that the CTI Server platform has adequate CPU processing speed and RAM to handle the message activity. You may require a high-end Cisco CTI Server/PG platform for the CTI Server.

Third-Party Call Control

Call control is the ability of an application that is external to the ACD to programmatically control a telephone call. For example, a CTI application can put a call on hold, transfer the call, or hang up the call.

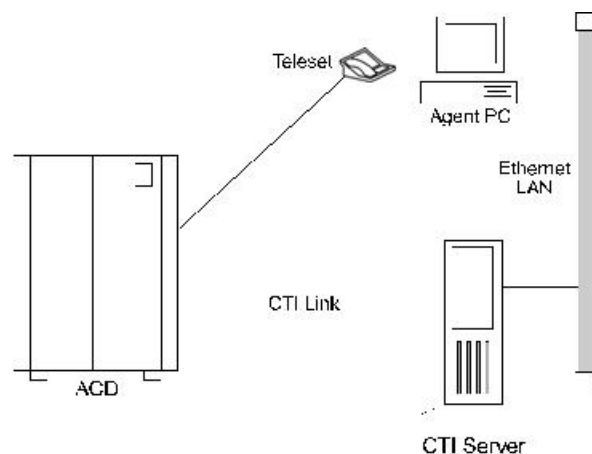
With first-party call control, the CTI application can control only the teletset that is physically connected to the computer running the CTI application. First-party call control requires a physical connection between the computer and the telephone and other add-on hardware (see the following figure).

Figure 5: Desktop First-Party Call Control



CTI Server products support third-party call control. Any call control initiated outside the ACD/teletset domain is referred to as third-party. With third-party call control, there is no physical connection between the computer and the teletset (see the following figure).

Figure 6: Desktop Third-Party Call Control



The desktop CTI application communicates with the Cisco CTI Server over a LAN. The CTI Server in turn communicates with the ACD to send call control requests. In this model, the CTI application is not bound to any particular teletset. The CTI application can control any teletset connected to the ACD and CTI Server.



Note Most, but not all, ACDs support third-party call control.

Depending on the specific ACD, the client application can perform all or most of the following telephony functions:

- Answer/Hang up
- Agent Login and Wrap-up data
- Consultative/Blind Conference
- Consultative/Blind Transfer
- Generate DTMF tones
- Get/Set Agent states
- Get/Set ICM call data (ANI, DNIS, CED, UUI, call vars)
- Hold/Unhold/Swap Hold
- Make a call
- Redirect

ACD Support for Client and Third-Party Call Control

Different peripheral types implement and support varying levels of CTI functionality. For example, a different set of client control requests and call event types are available depending on the peripheral type. In addition, there can be other CTI-related restrictions and implementation differences based on the type of peripheral. Consider these differences when you write a CTI client application that interfaces with third-party switches and devices.

As part of CTI pre-installation planning, review ACD support for client control and third-party call control.