

# **CTI Software: North American Market Update, 2006**

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# 1 EXECUTIVE SUMMARY

CTI software is very much in the maturing phase of the product category lifecycle. Sales are strong and overall market uptake is increasing although at a more modest rate. There were two new entrants into the worldwide market, one being Charmed (ME) Communication whose Charmed product is distributed in North America, and a new CTI product was introduced by Ericsson. Three products were dropped by companies that otherwise very much remain in business and one product was transformed into a non-CTI product. A few products offer capabilities they didn't in 2003 yet the support of Windows, Linux, Unix and other operating systems for the server and desktop is largely unchanged.

What has been most striking is the significant volume of sales and market share of Avaya, up significantly since 2003. Avaya had the largest share of 2004-5 sales in Canada, the USA and South America. Genesys came second in both North American markets and Cisco came second in South America.

What is also significant is that the number of licenses the various CTI software developers report selling in some of the markets analyzed well exceed the number of agent positions in call centers in that market. Clearly, many of the licenses that have been sold are not being used.

Although, unlike the [Computer Telephony Integration: from the Internet to the Desktop, in North America](#) report in which they were analyzed at some depth, PC-based and LAN-based telephone systems and PBXs are not covered in this update. Nonetheless, it can be reported that there have been, in contrast to the period from 1999 to 2003, few new products, discontinued products and developer bankruptcies in this sector.

# 2 INTRODUCTION

Within the smorgasbord of product categories of technologies used in call centers, the term "computer telephony integration" or CTI is a major one. CTI has long been widely understood to refer specifically to a category of software that was interfaced to the PBX, to the agents' desktops and possibly to the enterprise computers. This software enables computing and telephony applications to be integrated to deliver such well-known applications as screen population (screen pop), screen transfer with call transfer, screen/keyboard dialing and call routing, the last not to be confused with off-switch ACD. In addition to be a category of software product, CTI also refers to the specific interface between the server in which CTI software is invariably installed and the telephone system and the protocol used for this interface.

The more recent of LAN-based and PC-based telephone systems, many of which, as discussed in section 3.3, offer an integral CTI capability has lead to some confusion about the term CTI and given rise in some quarters to the ambiguous term "computer telephony" or CT. Some such systems, indeed, offer an integral CTI capability, although sometimes the CTI capability is more that of personal CTI than enterprise CTI, yet although there is no physical integration of components to

be done, the applications must still be integrated.

LAN-based and PC-based telephone systems, although analyzed at some length in the [Computer Telephony Integration: from the Internet to the Desktop, in North America](#) report, are beyond the scope of this update report as are such product categories as audio call recording systems, predictive dialers, collaborative browsing software, CRM software and e-mail management software which, although they may include a CTI capability are not, per se, CTI products.

For a detailed analysis of the use of CTI by such products as well as a directory of the products available in the North American market, the reader is referred to the above-cited report.

## **3 TOPIC DEFINITION**

### **3.1 CTI or CT?**

In recent years, a number of industry observers have used the expression “computer telephony” instead of “computer telephony integration”, implying either that the issue of integration has been addressed or that it has become a non-issue. This bold assertion requires some scrutiny.

Computing is generally perceived to refer to computing applications and the distinction between computer hardware and system software, the combination of which is generally referred to as computer systems, and computer applications, is well understood. This distinction is as applicable to the world of telephony, but it is much less well understood.

The advent of published CTI protocols has made the interfacing of some computer systems to telephone systems relatively straightforward, provided both systems support the same protocol. And the very widespread use of variants of the Windows operating system on desktops has similarly made the interfacing of CTI software and predictive dialers to agent desktops relatively straightforward. Even the interfacing to host computer systems is not that difficult.

However, integration at the application level is often an order of magnitude more complex, and as every application is unique, so is every integration between applications. Screen pop, the process of populating an agent’s screen with information about the caller and/or the sought function at the same time the call is presented to the agent, is an application and thus must inherently be customized for the requirements of the using organization. So must all other applications of CTI such as screen-based and keyboard-based dialing and semi-automatic collection of line-of-business codes.

Every application integration must be designed, scoped, designed in detail and implemented, using specialized labor. Integration of computing applications with the telephony application requires the creation of an application in its own right, a process that is essential to successful CTI deployment, yet this application integration is a surprising omission from most vendor presentations.

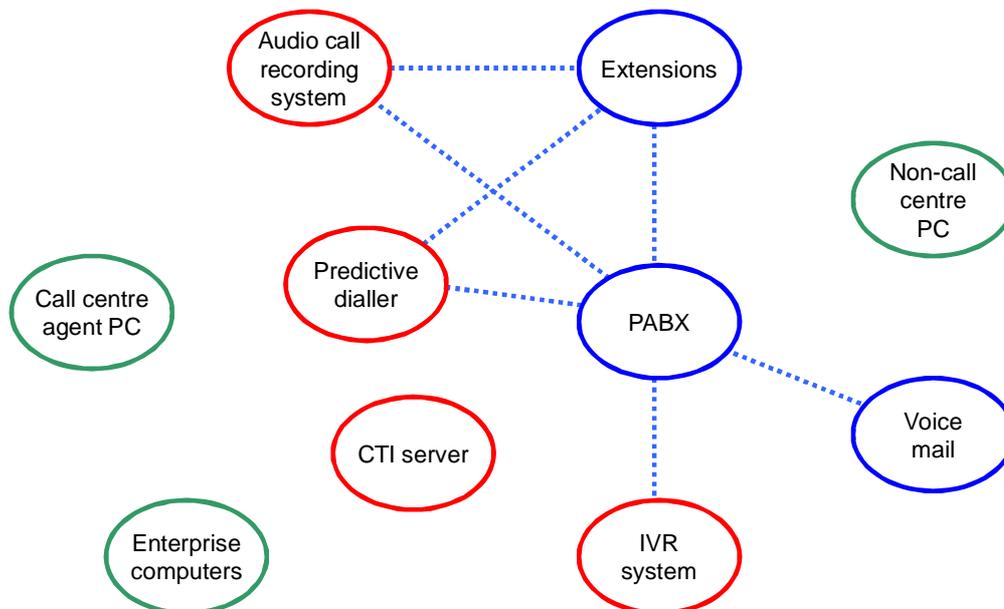
When an integral CTI capability is offered by a telephone system, unsuspecting buyers can be hoodwinked into believing that the integration has already been taken care of. It hasn't. Except for the almost trivial CTI applications such as soft phone, CTI applications require integration of the telephony function with enterprise computer applications and this application must be developed. Against this background, the term "computer telephony" which implies that the integration has become a non-event, does not stand up to the light of day.

When a computing system is to be integrated with telephony, the integration isn't just of systems, it's of applications.

### 3.2 Logical CTI Architecture

The interfacing of systems using CTI at the physical level is not only just one aspect of integration, it is often one of the less challenging tasks. An environment in which a CTI application and one or more applications using CTI is to be implemented will have a combination of telephony links, CTI links and computing links between any of a large number of pairs of systems. The implementation of each interface will have to be designed and configured, and will present challenges of its own.

Figure 1 - Logical Architecture Illustrating Telephony Links



The following four figures illustrate all of the functional elements which are likely to be part of any such environment. In Figure 1, the telephony circuits have been illustrated with dotted blue lines. As most of these will be standard extension

circuit to trunk circuit interfaces, their implementation will be straightforward. The only complications are where an audio call recording system must parallel a PBX's ISDN trunks or digital extensions. Both are achievable, but more work is required.

In Figure 2, the CTI interfaces have been illustrated with solid red lines. Although there are a number of CTI protocols and differences in the implementation of these CTI protocols with different systems, their implementation will still be relatively straightforward although a certain level of configuration is still required.

Figure 3 illustrates the same functional elements with the computing links illustrated with broken green lines. Not only are there more such links in this hypothetical scenario than of the other types, few of them are able to be implemented without considerable interface and application development.

**Figure 2 - Logical Architecture Illustrating CTI Links**

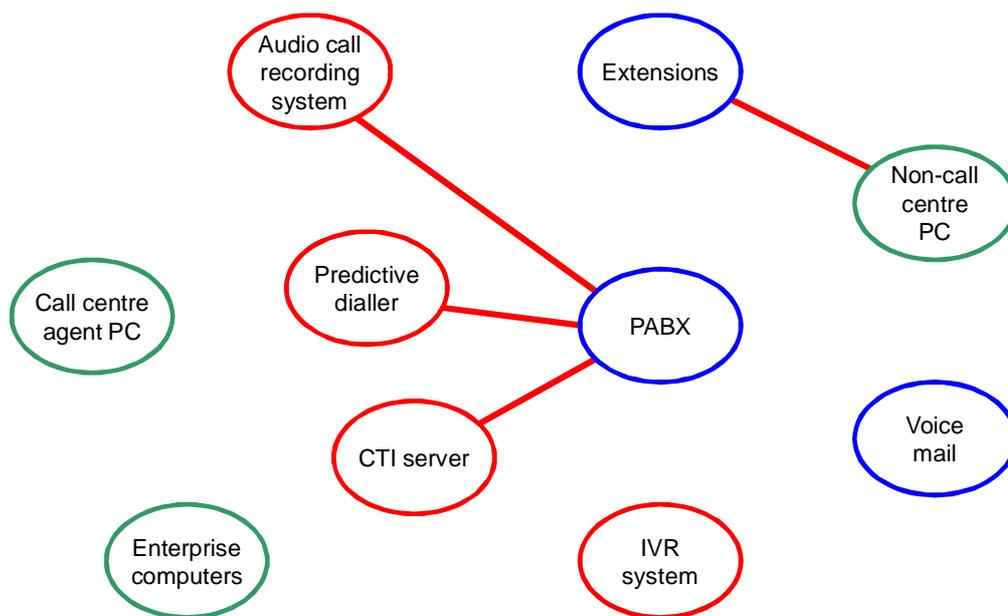


Figure 3 - Logical Architecture I Illustrating Computing Links

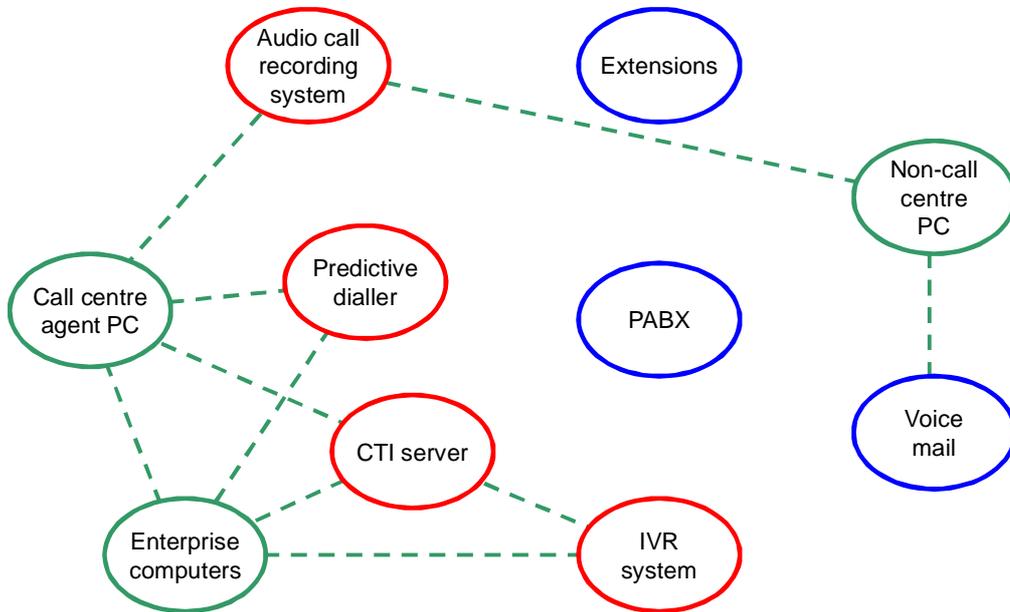


Figure 4 - Logical Architecture I Illustrating All Links

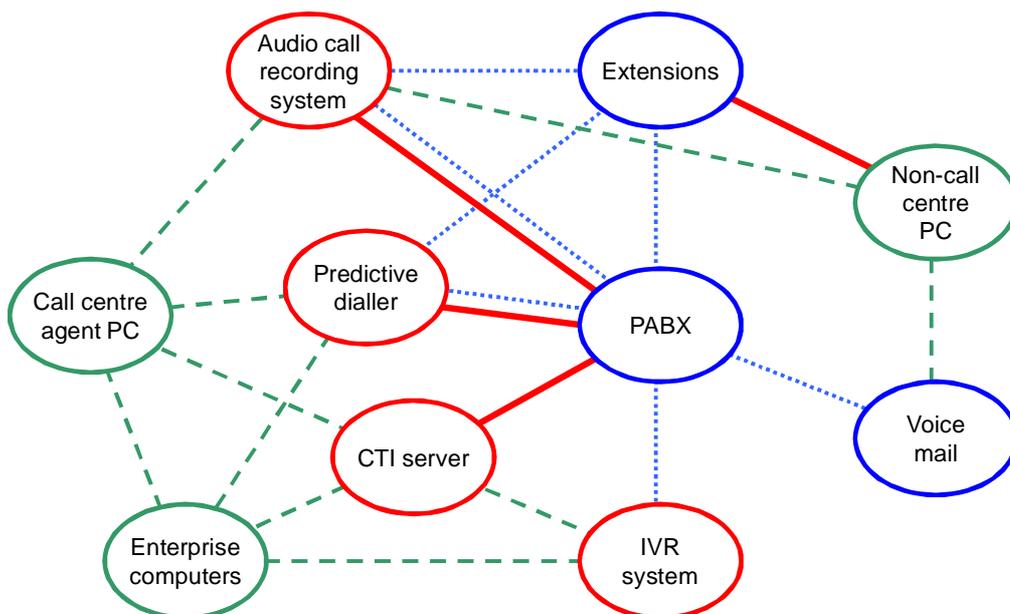


Figure 4 illustrates all of these links, a total of 21 all up. Of course most implementations of CTI will not include every functional element in the diagram,

nor will it require every one of the links illustrated. Nonetheless, an organization planning to deploy CTI must not underestimate the level of integration required, most of it not being of specific CTI interfaces. For a deployment of a CTI application or an application using CTI to be successful, every interface involved must be scoped, implemented and tested and many such interfaces will require considerable effort to do so.

### **3.3 LAN-based and PC-based Telephone Systems**

Falling within the umbrella of UnPBXs and sometimes described by the more ambiguous pseudo-categories of IP PBXs or PCXs, two new categories of telephone systems have begun to challenge key systems and PBXs for over a decade. Of these, those that transmit voice *only* through on-premise local area network technologies are most precisely categorized as LAN-based telephone systems. Those based on PC or server hardware, whether or not they support voice over IP are most precisely categorized as PC-based telephone systems. Both are certainly preferable to the ambiguous terms of IP PBX which can also be applied to PBXs that support IP circuits, a capability most now have.

LAN-based telephone systems and PC-based telephone systems as product categories were analyzed at length in the [Computer Telephony Integration: from the Internet to the Desktop, in North America](#) report and the replication of such a detailed analysis lies beyond the scope of this update report. Nonetheless, two specific points on the topic of CTI are particularly relevant. First of all, from one perspective, a LAN-based telephone system and a PC-based telephone system are not that different from a PBX. Provided the system supports a CTI interface, a capability most have, CTI software can be interfaced to such a system much as it can be to a PBX and support the same application.

Second, and perhaps more significantly, several such systems offer an integral enterprise CTI capability, enabling the core CTI functions of screen pop, screen transfer with call transfer, screen/keyboard dialing and call routing to be performed by the system itself without having to use a separate CTI software product. This has the advantage of not requiring two separate systems to be interfaced and may be less expensive than the cost of such a telephone system without the CTI capability plus CTI software. However, the CTI capabilities of such a telephone system are unlikely to match those of an established CTI software product, much as the CD player module within an all-in-one stereo system is no match for a discrete CD player. But more significantly, use of an integral enterprise CTI capability does not alleviate the necessity of having to integrate the applications, something the widely touted term "convergence" tends to imply.

And finally, it should be noted that some LAN-based and PC-based telephone systems offer only personal CTI, useful for a person working on their own, but not for a call center.

Following the publication of the [Computer Telephony Integration: from the Internet to the Desktop, in North America](#) report in late 2003, there has been two new LAN-based telephone systems, one being the evolution of UK-based Rostrvm's

Rostrvm Suite to be able to be deployed either as a LAN-based telephone system or as CTI software, one PC-based telephone system developer has gone bankrupt, another has dropped its product and one developer has been acquired by another against which one predictive dialer developer has converted their product to such a system. But compared to the dynamics of the market between 1999 and 2003, changes to this market between 2003 and 2006 have been minimal. As with CTI software, such products continue to evolve, albeit slowly and quietly.

### 3.5 PBXs

As with LAN-based and PC-based telephone systems, PBXs and hardware ACDs were analyzed at length in the Computer Telephony Integration: from the Internet to the Desktop, in North America report and that analysis will not be replicated here. Nonetheless, what is relevant to this update is that every one of the PBXs available in the North American market supports at least one third-party CTI protocol – most support a few – although a few support only a protocol proprietary to its manufacturer. It should also be noted that although some PBXs include a CTI interface as a standard offering, for others, it comes at a cost, not necessarily a trivial cost.

Although PBXs, as a product category, are mature products, the Computer Telephony Integration: from the Internet to the Desktop, in North America report observed that there remained significant opportunities for the introduction of features which would offer significant product differentiation, ranging from the basic yet overlooked availability of handsets with the handpiece on the right and keypad on the left for left handers, to licensing the backplane interface to enable developers of IVRs etc. to offer circuit-card only versions of their products for incorporation into the PBXs' chassis.

As a group, the PBX manufacturers do not appear to have made any progress introducing such capabilities.

## 4 CTI SOFTWARE

CTI software, as a product category, may be comprised of three basic feature sets: core capabilities; optional peripheral capabilities and off-switch ACD. Underlying these is the support of one or more CTI protocols enabling the CTI software to be interfaced with the telephone system and the client-server module to support the PCs on the agents' desks.

The core capabilities are a set of tools enabling the development of the well-known features of screen population, screen transfer with call transfer, screen/keyboard dialing and call routing. All CTI products have such a toolkit from which these capabilities can be developed and these are discussed in more detail in the following sub-section.

The most commonly offered optional peripheral capabilities include IVR, predictive

dialing, audio call recording, queuing and routing of e-mails and collaborative browsing using either callbacks or voice through the Internet. One or more are offered by many but not all CTI products for call centers. Non-call center CTI software, not covered in this update, may offer voice mail, unified messaging and non-predictive dialing as optional capabilities. The offering of optional capabilities is covered in more detail in section 4.2.

Off-switch ACD is the capability of a CTI product to provide an ACD capability in place of that offered by the telephone system, of particular use for those telephone systems whose own ACDs are inadequate. This is discussed in section 4.3.

## **4.1 Core Capabilities**

### **4.1.1 Screen Pop and Screen Fill**

Undoubtedly the most widely used non-personal CTI application, if not the most widely used of all CTI applications, is screen population, widely abbreviated to screen pop. Estimates of the penetration of CTI in North American call centers range from 10% to 35%. A computing function enhanced by telephony, screen pop is the population of a user's PC with screens and data relevant to the caller and the call purpose at the time the call is presented to an agent.

Exactly what screens are popped and with what they are filled depends upon what is known about the caller and call purpose when the call is thus presented, with the call DNIS, CLI and IVR selections all contributing to the selection of the screen and with what it is populated. It also requires some differentiation between screen pop, the presenting of a screen that is broadly relevant to the subject matter of the call, and screen fill, the filling of that screen with information that is specific to the caller.

The screen pop mechanism, well established and discussed at length in Computer Telephony Integration: from the Internet to the Desktop, in North America, in the overwhelming majority of installations uses information gathered from the caller's interaction with the organization's IVR. While IVR application design falls outside the scope of this report, the importance of having a well-designed IVR application cannot be overemphasized. The better the design, not only will more callers conclude their call within the IVR, those transferred to an agent will be more likely to have interacted with the application to an extent that their identity and purpose of their call are more likely to be able to be filled into the screen as it is popped for the agent.

If a well-designed CTI application, popping screens populated from data from a well-designed IVR application is at the top end of the application quality scale, the bottom end is typified by what is often termed "soft phone".

As a function of CTI software, a soft phone delivers information about the call, typically from the CLI and DNIS only, via a window on the agent's PC. When one considers the scenario of a call center agent being presented with such summary information in this window in the corner of the screen and then having to Alt-Tab to the production system and manually request the application screen most relevant

to the caller and manually request the pages for that caller, the gap between basic screen pop as exemplified by the soft phone and comprehensive CTI become readily apparent. Of course, not all CTI software includes a soft phone and users do not have to use one even if it is provided, but desktop integration is an issue that must be addressed.

As it can both save costs and improve customer service, screen pop is one of the easiest CTI applications to justify in a cost/benefit analysis. But one must not lose sight of the related factors necessary for these benefits to be realized. In summary, the following factors are necessary for screen pop/screen fill to be a success:

- I Short overall call duration;
- I Well-designed IVR application;
- I Interface between CTI software and IVR system that provides a summary of each caller's interaction with the IVR;
- I PC software able to pop screens and fill them with data specific to different call scenarios;
- I Known volumes of each of a number of defined call scenarios for which screen pop/screen fill is able to be implemented.

### Real Screen Pop and Ersatz Screen Pop

With prominent promotion of the soft phone and the associated claim that CTI can be implemented out of the box, the differentiation between real screen pop/screen fill and its ersatz equivalent must be made. Although the scale is continuous, the following key points on the functionality line have been defined to clarify this issue.

#### Basic Softphone

|                         |   |
|-------------------------|---|
| Operation               | A window of the CTI application indicates an incoming call and displays the CLI |
| License costs           | moderate to high  |
| Application development | negligible  |
| Integration             | negligible, integration with PBX only   |
| Benefits                | negligible, no additional benefit over display of CLI on agents' handsets       |

#### Integrated Softphone

|                         |   |
|-------------------------|---|
| Operation               | A window of the CTI application indicates an incoming call and displays the CLI and, if in the database, the name of the caller |
| License costs           | moderate to high  |
| Application development | moderate  |
| Integration             | moderate, requires integration of a database with names and telephone numbers   |
| Benefits                | limited   |

### Subject-specific Basic Screen Pop

|                         |   |
|-------------------------|---|
| Operation               | A screen of an enterprise computer application, specific to the subject matter of the call, is popped |
| License costs           | moderate to high  |
| Application development | moderate  |
| Integration             | moderate, requires integration with IVR (with auto-attendant application) and desktop PCs             |
| Benefits                | moderate  |

### Customer-specific Basic Screen Pop

|                         |   |
|-------------------------|---|
| Operation               | A screen of an enterprise computer application is popped, and filled with details of the caller |
| License costs           | moderate to high  |
| Application development | moderate to high, IVR application may require further development                               |
| Integration             | moderate to high, requires integration with IVR and desktop PCs                                 |
| Benefits                | moderate  |

### Comprehensive Screen Pop

|                         |  |
|-------------------------|--|
| Operation               | A screen of an enterprise computer application, specific to the subject matter of the call, is popped, and filled with details of the caller |
| License costs           | moderate to high   |
| Application development | moderate to high, IVR application may require further development  |
| Integration             | moderate to high, requires integration with IVR and desktop PCs  |
| Benefits                | high   |

#### 4.1.2 Screen Transfer with Call Transfer

Screen data transfer with call transfer is, with screen pop, one of the longest-established and best-known of CTI applications. As it a computing function facilitated by a telephony function, all it requires is that the PBX be able to signal, via the CTI interface, that a call has been transferred from one extension to another and the CTI application does the rest.

The screen transfer with call transfer mechanism includes, for the presentation of the screen to the agent to whom the call is being transferred, much the same mechanism as that for screen pop with, as discussed at length in [Computer Telephony Integration: from the Internet to the Desktop, in North America](#), two key differences. The first is that the CTI software must determine what screens are already displayed and with what they are populated on the PC of the agent from

whom the call is being transferred. The second is that for a brief period during the transfer, both agents will require read/write access to that customer's record or records and both will need to be able to access the record simultaneously, even if only for a few seconds.

The latter is a database issue, not a CTI software issue and it is overcome using a database feature termed "row-level locking" which nominally grants read/write access, which is actually read-only access until one wants to make a change when the access is changed to read/write only for the few milliseconds required to make the change.

### **4.1.3 Screen/Keyboard Dialing**

The third core capability of CTI software is screen/keyboard dialing. Even in call centers with predictive dialers, there are instances when agents need to make outbound calls on an ad hoc basis and for an agent to have to manually dial a number displayed on the screen is quite primitive.

Implementation of screen/keyboard dialing requires that the field or fields from which the number to be dialed is to be extracted, any reformatting to be performed and perhaps toll barring to be applied all need to be specified and implemented, possibly for a number of enterprise application screens.

Although this would appear to be relatively straightforward, there are a few complications. To begin with, the overall design must consider an incoming call that is dialed or assigned to the initiating extension after the call request was sent to the server but before the outbound call was connected to the extension. This can be done if the PBX temporarily blocks any other calls from being connected to the extension until after the requested call is connected and completed. An alternative is to have the extension immediately connected to the trunk after which the extension user will hear the call, from ring tone to engaged tone, invalid number message, answering machine or answering party as the case may be.

As with screen pop for incoming calls, screen/keyboard dialing can be implemented in either a limited-use basic manner or a more comprehensive and more useful manner. Basic screen pop utilizes a CTI-application specific telephony window or soft phone into which the user keys the telephone number. If they are really lucky, they may be able to cut and paste it from the application or the soft phone may have a directory of numbers. However, comprehensive useful screen/keyboard dialing requires that the user be able to dial a number from an enterprise computer application such as a CRM application, and that they be able to do so with either a simple keyboard or mouse command.

Comprehensive screen/keyboard dialing must be designed, specified and implemented and it must be implemented in a configuration to fit the enterprise computer systems and business processes of the using organization. As with so many other applications of CTI, the CTI application software must be specifically configured to fit the needs of the using organization, not the other way around.

#### **4.1.4 Call Routing**

Telephone systems with an ACD capability traditionally had queues, each for a particular function within the call center. Each queue would have a pilot number and the assignment of calls to queues via their pilot numbers is call routing. So, for that matter, is transferring a call from one extension to another. PBXs are typically configured to route calls received on different indial numbers to different pilot numbers and hence queues. Similarly, IVR systems transfer calls to different pilot numbers and hence queues depending upon the caller-entered customer number and/or menu selections.

Whether or not DNIS and/or IVR selections are used for call routing, the one other assignment criterion that can be used is the call's calling line identification (CLI). Where this is done, an incoming call's CLI is passed to the CTI application which looks up the CLI in a CRM or other enterprise computer application and sends a message to the PBX instructing it to assign the call to the most appropriate queue.

Termed customer data-based routing, this is a telephony function enhanced by computing that can be used, for example, to route the call of a customer whose account is overdue to a collections group or to route a gold customer's call to a group dedicated to serving such customers. A variation of this, to route a call to the agent with whom the caller most recently spoke, often cited in vendor literature yet rarely successfully implemented, appears to not be promoted to the extent it has been in years gone by.

Most call centers instead use a combination of DNIS and IVR selections to route calls, albeit not always that comprehensively, with the better managed call centers usually using both.

One significant call routing feature is the capability for CTI software to be implemented in a carrier network enabling that carrier to offer, for customers with two or more call centers, the ability to have the CTI software monitor parameters in each call center enabling incoming calls to be routed to the call center for which the forecast wait time is the shortest. This capability, offered by only a few CTI products, requires that the software be implemented by the carrier in the carrier network and configured to perform the call routing appropriately.

Returning to the phone systems themselves, modern telephone systems still have queues, but the queues feed calls to agent skill groups with agents being able to be assigned to one or more such skill groups. The assignment of calls to agents based on agent skill is generally referred to as "skill-based routing", however, as it has absolutely nothing to do with routing, it is more accurately referred to as skill-based call assignment.

## **4.2 Optional Capabilities**

Although some offer none, the majority of CTI software products offer one or more of IVR, predictive dialing, audio call recording, collaborative browsing, e-mail processing as an optional capability. One advantage of using such capabilities is that their cost is very likely to be less than that of a comparable stand-alone

system. A second advantage is that integration between such capabilities is within the system not requiring external interfaces.

However, it must never be assumed that such integration is automatic any more than a spreadsheet and text document are automatically integrated because both exist within the one PC. An IVR application requires just as much careful design, including design of what data is to be collected for each call should it be required for screen pop whether implemented within CTI software with an IVR capability or within a dedicated IVR. The same applies to the other optional capabilities.

There is a parallel between CTI software including these optional capabilities and an all-in-one stereo sound system. Such a sound system will suit the requirements of many users, but for a person with a new and highly-featured CD player, or who wants a turntable to play his or her collection of 78s, an all-in-one stereo system just won't do. This can be particularly the case for the IVR and audio call recording requirements which have inherent hardware requirements, and even predictive dialing may require a server and dedicated PBX to CTI circuits just to provide call progress detection.

The optional capabilities offered by CTI software products in the North American market has, on the whole, increased slightly since 2003 as illustrated in Table 1. The increase has, though, is more an outcome of products entering and departing the North American market than features being added to existing products.

**Table 1 – Optional Capabilities of CTI Software Products**

| <b>Integral Capability</b> | <b>1 CTI products (worldwide) offering this capability in 1999</b> | <b>1 CTI products (in North America) offering this capability in 2003</b> | <b>2 CTI products (in North America) offering this capability in 2006</b> |
|----------------------------|--|---|---|
| IVR                        | 19 (38%)   | 15 (50%)  | 24 (67%)  |
| Predictive dialing         | 18 (36%)   | 13 (43%)  | 13 (36%)  |
| Audio call recording       | 9 (18%)  | 10 (33%)  | 14 (39%)  |
| Collaborative browsing     | 14 (28%)   | 16 (53%)  | 23 (64%)  |
| E-mail processing          | 3 (6%)   | 15 (30%)  | 22 (61%)  |
| Off-switch ACD             | 16 (32%)   | 17 (57%)  | 20 (56%)  |

### **4.3 Off-switch ACD**

The core of every call center is an ACD which may be a software module supported by the PBX or hardware ACD or an optional software module of CTI software that otherwise performs the standard CTI functions of screen population, etc. Although almost all PBXs offer an ACD facility, only some do it well.

Similarly, some CTI products offer an ACD facility and only some of them do it well. Although not an issue for most call centers, a call center that has or is planning to deploy both a switch and a CTI system that each offer comprehensive ACD capabilities is faced with the choice of which system should actually perform this function. Setting aside the jargon that switches are supposedly proprietary (see the glossary) and CTI software supposedly is not, both options have their inherent advantages and disadvantages which are covered in Computer Telephony Integration: from the Internet to the Desktop, in North America (Bloor Research, 2003) and won't be repeated here.

Of the 36 CTI software products in the North American markets, 20 (56%) offer an off-switch ACD capability with the cost of this capability ranging from zero to \$2,100 per agent. The average per agent price, of those products for which vendors provided a separate cost for this capability, is \$750.

#### **4.4 CTI Protocols**

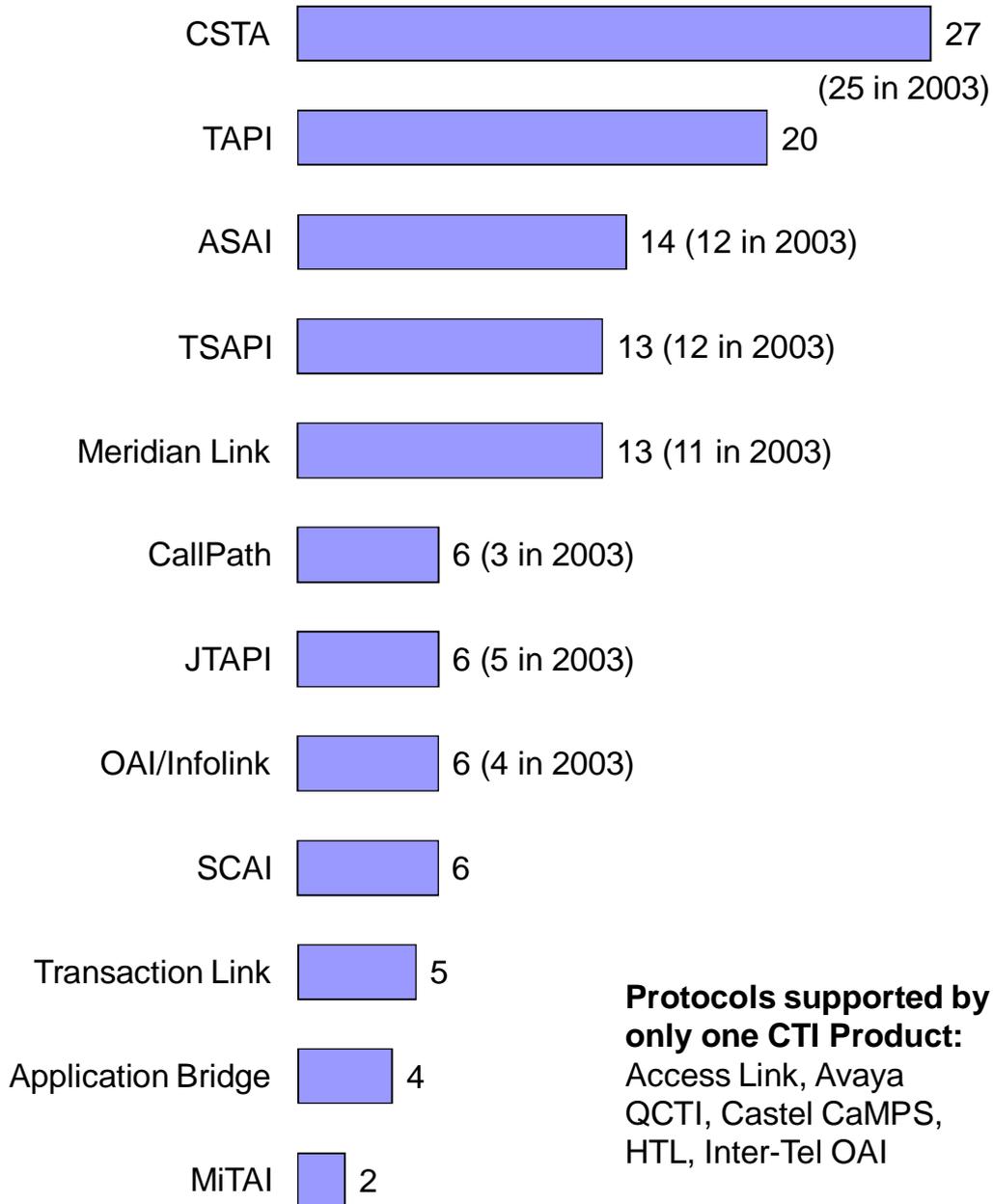
In 2003, there were a total of 33 CTI software products available in the North American market which supported one or more of 19 different CTI protocols. In 2006, there are 36 CTI software products available in the North American market which support one or more of 17 such protocols, although there was a slight change in the set of protocols and the numbers of products supporting some of them. Support of individual protocols is as follows:

- I The most widely supported protocol remains CSTA, supported by 27 of these products, up from 25;
- I The third-party version of Microsoft's TAPI protocol is supported by 20 products, unchanged from 2003;
- I TSAPI is supported by 13 products, up from 12;
- I ANSI's SCAI protocol continues to be supported by six products;
- I Java-based JTAPI is supported by six products, up from five;
- I Support for IBM's CallPath protocol has increased from three products to six;
- I The two most supported PBX vendor-specific protocols are Avaya's ASAI, supported by 14 products, up from 12, and Nortel's Meridian Link supported by 13 products, up from 11.

The following figure illustrates the number of systems of all types that support each of the various CTI protocols.

## Figure 5 - CTI Protocol Support

**CTI Protocol Number of CTI products supporting this protocol**



### 4.5 CTI Application Software

#### 4.5.1 The World CTI Vendor Landscape

There are in the order of 73 commercial call center/desktop CTI software products available from 71 developers around the world, a slight decrease from 74 in 2003. Independent of capabilities, pricing and alliances, these can be classified into the following seven groups, by market presence.

- 1 Vendors present in most geographic markets (North America, Europe and the Asia Pacific) with sizeable installed bases and market shares: Aspect, Avaya, Cisco, Envoy, Genesys and, perhaps, Altitude Software;
- 2 Vendors present in most geographic markets with a more modest installed base and market share (perhaps eight products);
- 3 Vendors with a significant presence in North America with a possible modest presence elsewhere (CTI Lab, Line 4, Spanlink and Upstream);
- 4 Vendors with a significant presence in Europe with a possible modest presence elsewhere (six products);
- 5 Vendors with a significant presence in Asia with a possible modest presence elsewhere (two products);
- 6 Vendors with a significant presence in Australasia with a possible modest presence elsewhere (two products);
- 7 Everyone else, vendors that are typically present in only one, or possibly two continents, but with modest installed bases.

Although a few vendors have moved from one group to another, the only significant change in the above has been the entry of Envoy into the first group, via its acquisition of the CT-Connect CTI product suite from Intel and the corresponding departure of Intel from this market. During the same period, Concerto's (subsequently renamed Aspect Software) Ensemble CTI software product, one Swedish and one Australian product were dropped, and one Australian product was transformed to no longer be a CTI product. At the same time, new CTI products were brought to the market by companies in Australia, the UAE and Sweden's Ericsson.

The North American market as a whole offers a large choice of CTI software products with 36 products from 34 developers. All of these products are distributed in the USA and about half in Canada. Although there are more products in Europe with 49 products from 47 developers, the North American market has more products than Asia (23) and Australasia (16).

#### **4.5.2 Operating Systems**

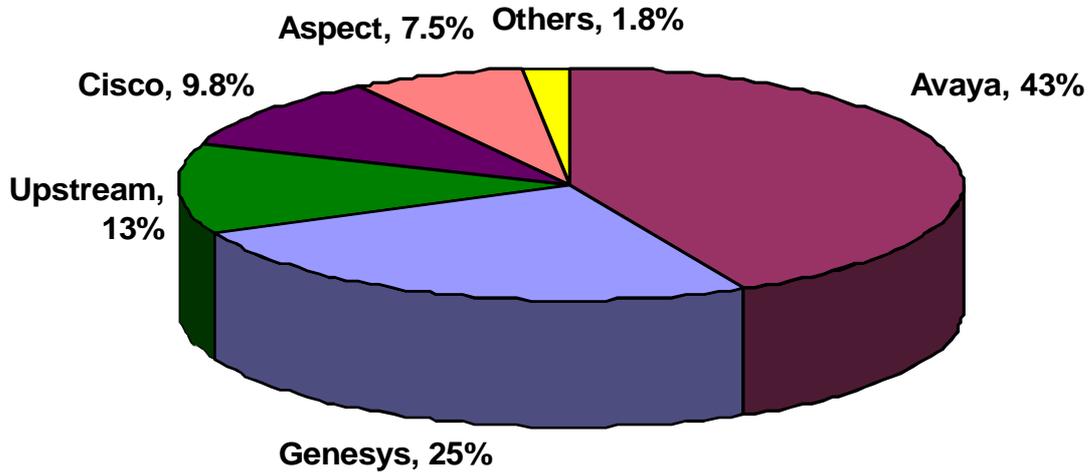
Every CTI software product in the North American market supports Windows as the server operating system as was the case in 2003. Eight support Unix, a decrease from nine, six support Linux, an increase from five, one support OS/400 and another IBM's mainframe OS. Not surprisingly, all CTI products support Windows on the agent desktop. Five also support Unix, three support Linux, three support Apple Macintosh and one supports an IBM mainframe VDU on the desktop, almost identical to the tallies in 2003.

#### **4.5.3 The Americas Markets, 2004-5 Sales**

Bloor Research has measured CTI software sales in each of Canada, the USA and South America as a whole by numbers of licenses, independent of reseller and value of sales. Avaya had the highest share of each of these three markets. Genesys came second in Canada and the United States and Cisco had the second highest share in South America. Market sales shares for these markets

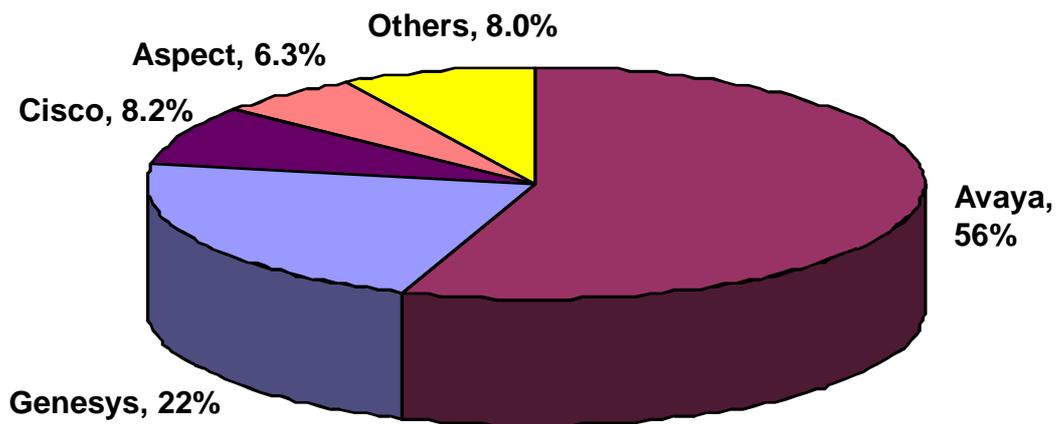
are illustrated in the following pie charts.

**Figure 6 - 2004-5 Canadian CTI Sales**



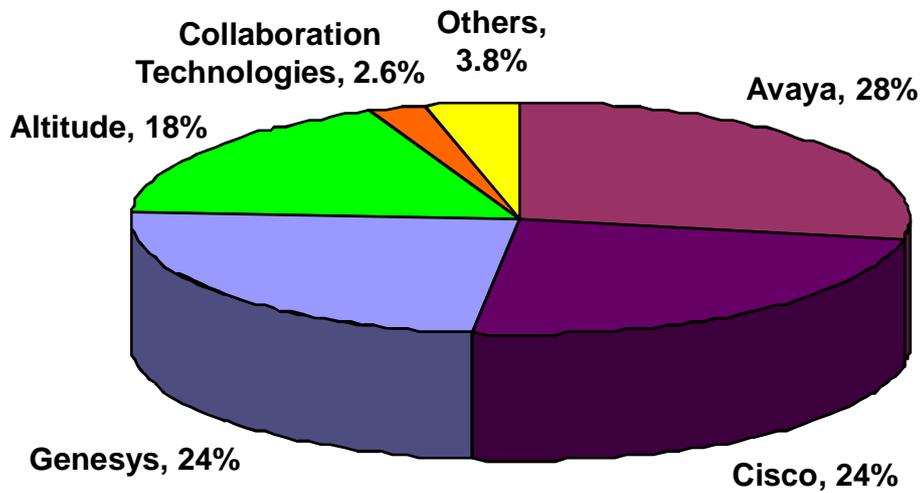
These market shares are of seats, by product, independent of reseller or systems integrator.

**Figure 7 - United States CTI Sales**



These market shares are of seats, by product, independent of reseller or systems integrator.

**Figure 8 - South American CTI Sales**



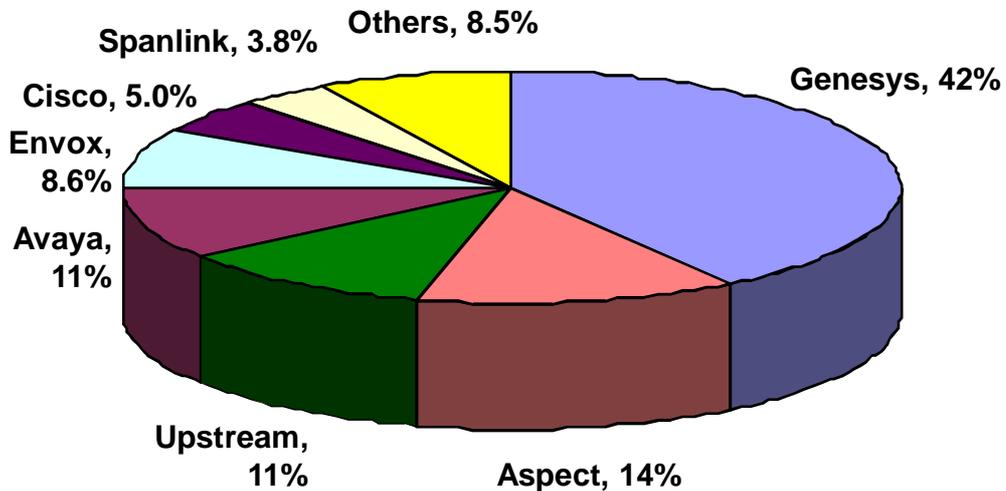
These market shares are of seats, by product, independent of reseller or systems integrator.

One point that needs to be made concerned named and concurrent licenses. The above pie charts represent license numbers as provided by or calculated for the developers in question. As some vendors sell their software by named licenses, ie. one license for each employee, whereas others sell it by concurrent licenses, ie. one license for each person working at a given time, those selling by named licenses will have sold significantly more licenses than the number of agent seats at the sites where this software is used than those who sell concurrent licenses.

#### **4.5.4 The Americas Markets, Installed Base**

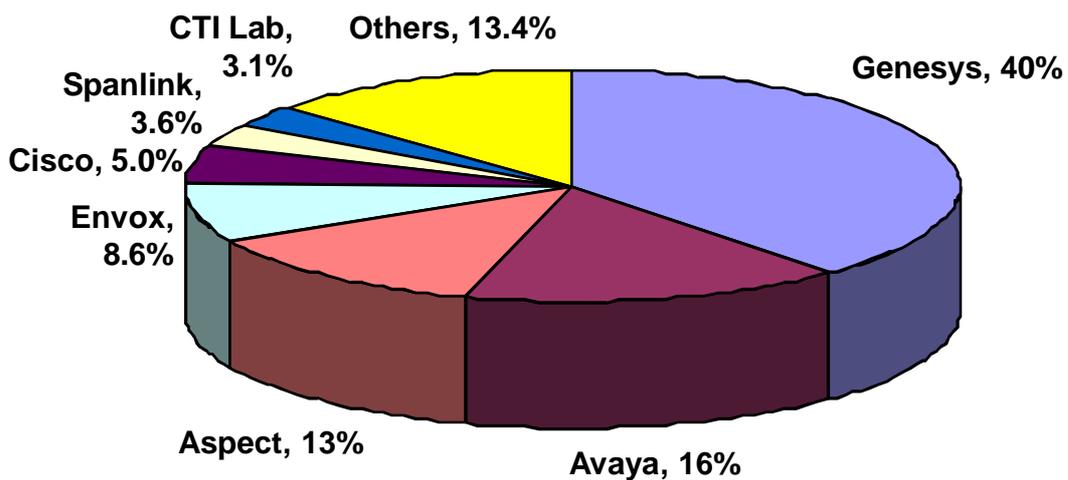
Bloor Research has also tabulated the installed base of CTI software products for these same three markets. Genesys has the largest installed base in each of Canada and the USA whereas Altitude has the largest installed base South America.

**Figure 9 - Canadian CTI Installed Base Market Shares**



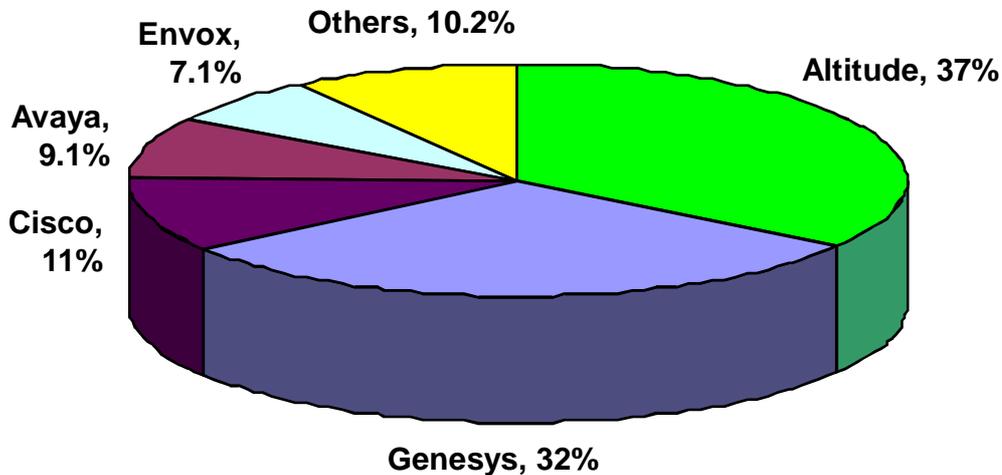
These market shares are of seats, by product, independent of reseller or systems integrator.

**Figure 10 - United States CTI Installed Base Market Shares**



These market shares are of seats, by product, independent of reseller or systems integrator.

**Figure 11 - South American CTI Installed Base Market Shares**



These market shares are of seats, by product, independent of reseller or systems integrator.

Actual numbers of licenses sold in 2004-5 and installed seats, or in a few cases, partial information enabling the numbers of licenses and seats per market to be calculated were provided by Altitude, Amcom Software, Aspect Software, Avaya, Cisco Systems, Collaboration Technologies, Easyrun, Envoy, Ericsson, Grutzeck-Software, IFM Infomaster, IntraNext Systems, Mediatel, Predictability Plus, QCS, QGate, Servion Global Solutions, Teltronics, Upstream Networks and Zeacom. The remaining vendors with a presence in North America, typically minor vendors, would not provide information. However, as most of these had provided the author with installed base information in 2003, comparable figures for 2006 were able to be estimated.

## **5 OBSTACLES TO THE IMPLEMENTATION OF CTI**

Estimates of the percentages of call centers in North America that have implemented a CTI application range from 25% to 35% and although there are many of the others that will not benefit from a CTI application, there are many of them that will. As CTI software products have been available for more than 10 years, those call centers that would benefit from a CTI application but do not yet have one clearly perceive obstacles to implementation, with lack of awareness of CTI unlikely to be one of them.

There are a number of obstacles that prevent the implementation of CTI in those call centers where it would deliver demonstrable benefits, and these are discussed in the following four sections.

## 5.1 Cost

The cost of acquiring and implementing a CTI application ranges from less than \$650 to over \$4,000 per agent, with the cost depending upon the CTI product selected, hardware and, of course, the complexity of the application. The per agent list prices of the products for which vendors provided list prices are listed in Table 2.

**Table 2 – List Per Agent License Fees for CTI Software**

| <b>Per Agent License</b> | <b>Number of Products</b> |
|--------------------------|---------------------------|
| less than \$250          | 3                         |
| \$250-499                | 5                         |
| \$500-749                | 4                         |
| \$750-999                | 3                         |
| \$1,000-1,499            | 5                         |
| \$1,500-1,999            | 6                         |
| \$2,000-2,499            | 2                         |
| more than \$2,500        | 1                         |

It should also be noted that Envov's CT-Connect product can be bought with a site license allowing an unlimited number of users at that site. The average of list license costs per agent is \$1,040, a slight increase on the 2003 average of \$970. The average weighted by North American market share is \$800, a significant increase from the 2003 USA market share weighted average price of \$410. It would appear that this increase is due largely to shifts in market shares.

Of course, license fees only buy licenses which do not delivery benefits. Benefits are derived from applications which must be developed, the cost of which is comparable to the proverbial length of a piece of string. Typically referred to as professional services, from information provided by CTI software vendors, the cost of application development for applications typically ranges between 10% and 150% of license fees with that of serious applications towards the upper end of this range. However, other vendors cited system development costs ranging from \$3,000 to \$60,000.

In their responses to questions for the preparation of this report update, cost was the barrier to the implementation of CTI most cited developers of CTI software, although some stated that it was more a matter of lack of cost certainty or a definitive return on investment (ROI) than cost itself. It is interesting to note that while cost is often cited as a barrier to the implementation of CTI, the cost of implementing a CTI application is significantly less than that of a CRM application many of which have been purchased with much less trepidation than some organizations have towards CTI.

It is very likely that when cost is cited as a obstacle to the implementation of CTI, the real reason is a lack of a properly prepared business case including a

comprehensive financial analysis of the total project costs the implementation of a CTI application will incur and the benefits it will provide. An organization that is considering implementing CTI would be well advised to estimate the implementation costs and estimate the benefits. Not all call centers need a CTI application.

Although time consuming and perhaps tedious, quantifying the savings that a CTI application will provide is just as essential as quantifying the costs, as both are necessary for preparing a business case. Unfortunately, many of the persons who are sufficiently familiar with the technological aspects of deploying CTI are not as skilled at preparing business cases and performing net present value calculations.

Related to the issue of total cost is cost containment. Management will rightly want to ensure that the system is implemented for a known cost and that this expenditure will cover all costs necessary to deliver the promised benefits. This is why the approach of designing the application in detail and including this application specification in the request for tender, proposal or quotation to which the vendors will respond is so important.

## **5.2 Over-Purchasing**

*A bargain is only a bargain if you actually need it.*

Another issue related to cost per seat is that of buying unnecessary capabilities. Several call center/desktop CTI products also offer integral IVR, voice mail, predictive dialing, audio call recording, e-mail processing, collaborative browsing, text chat and off-switch queue control capabilities. These are typically offered as optional capabilities and, of course, each additional module incurs additional cost.

A total of 24 of the 36 CTI products in the North American market offer an integral IVR capability and with most of these, this capability is available as an option. For an organization that either has no IVR or has an IVR system that is genuinely not up to the task, the selection of such an option has its advantages. However, if the current IVR application is wanting but the IVR system is robust, writing a new IVR application and implementing it on the current IVR platform would be far more cost effective than writing a new IVR application *and* implementing it on the optional IVR component of a CTI software platform.

As there is no inherent linkage between a CTI application and that of audio call recording for either logging or quality monitoring applications, the only reason to buy an audio call recording capability as part of a CTI application is because both applications are required and a system offering both is determined to be as capable as but less expensive than separate systems. 14 call center/desktop CTI products also offer audio call recording.

19 call center/desktop CTI products offer both e-mail processing and collaborative browsing as optional capabilities and another seven offer one or the other as options. However, while most companies receive some e-mails only some operate an Internet site with an e-commerce function, only some of them have a

need to offer collaborative browsing or text chat facilities. For an organization to offer collaborative browsing and/or text chat, they will have to acquire a product that offers these capabilities. However, there is little advantage in buying a call center/desktop CTI product that offers one or both of these capabilities over buying one call center/desktop CTI product and a separate collaborative browsing/text chat product, if the two separate products offer better functionality and/or are more cost effective.

E-mail processing is a little different. If there is a need for automatic contact blending, there is a requirement for the system that assigns e-mails to be integrated with the system that assigns calls. There are thus some advantages of having one product managing both calls and e-mails but a buyer should not be blinded to the capabilities of discrete products that can be integrated. And even if one product is selected to provide both capabilities, there is no need to buy all of the licenses at the same time.

In this regard, predictive dialing has much in common with e-mail processing. Although they can be provided by separate systems, the system that provides the predictive dialing needs to be integrated with the telephone system. But there is no inherent advantage in buying a call center/desktop CTI product that also offers predictive dialing, which 13 of the 36 call center CTI products do, over separate products. Indeed, on some acquisition projects the author has undertaken for clients, predictive dialing capabilities of other products have scored significantly lower than discrete products.

Finally, and most significantly, is the optional capability of off-switch queue control or off-switch ACD. A total of 20 of the 36 CTI products (56%) available in North America offer this capability. When the author first researched CTI products six years ago, about 25% of the 80 products worldwide then identified offered this capability. Although some products that previously did not offer this capability now do, the increased popularity of this option can be attributed, at least in part, to the increased need to provide ACD facilities at sites using PBXs with mediocre ACD capabilities.

A call center using a PBX or centrex service with mediocre ACD capabilities will, of course, benefit from using a call center/desktop CTI product which also offers off-switch queue control. At the same time, several of the PBX/ACDs and ACDs are recognized to have automatic call distribution capabilities that are excellent. A call center using one of these products will be well advised to seriously assess the costs and benefits from implementing a call center/desktop CTI product's off-switch queue control capability as it will reduce their highly-capable and probably expensive switch to a dumb PBX.

In summary, buying organizations must approach any acquisition process with a comprehensive specification of exactly what they require and, by implication, what they do not. Such organizations must ensure they are not persuaded to buy capabilities they do not require or buy all components of a product suite of which only some are actually required.

## 5.3 Technological Barriers

Once the biggest barrier of them all, technology presents less of a barrier to CTI than it once did. As almost all PBXs and a majority of PC-based and LAN-based systems support one or more of the standard and de facto standard CTI protocols, although interfaces must be configured and testing, the actual interfacing of the telephone system with the CTI software is rarely a significant challenge.

Nonetheless, there are technological barriers to the deployment of CTI applications even when interworkability can be demonstrated. These include:

- I Acquiring the CTI interface for the PBX may be expensive and may require a PBX software upgrade;
- I There may not be an off-the-shelf interface between the chosen CTI application and the existing or chosen IVR system;
- I The use of low-speed CTI links by some switches may impact the CTI application in a high traffic environment;
- I Not all switches support call progress detection necessary to allow the use of a software-only predictive dialer;
- I Not all switches support the conference calls on demand via the CTI link to support an audio call recording system using dedicated audio circuits;
- I Only some switches allow agents to be logged in and logged out or assigned to a skill set under CTI control, necessary for ensuring agents are not simultaneously assigned e-mails and phone calls;
- I Not all enterprise databases support row-level locking or equivalent, necessary for screen transfer with call transfer;
- I Enterprise computer applications may not be up to the task;
- I The gateway required to be used between the switch and CTI system may not be sufficiently robust.

Amongst the technological barriers cited by CTI software developers as barriers to CTI included the poor implementation of CTI interfaces by some PBX manufacturers, a lack of ready integration between CTI software and IVR systems, integration with older databases, complexity and PBXs not supporting standard protocols.

## 5.4 Misinformation

Of the factors which inhibit the uptake of CTI, one of the more significant yet unnecessary factors is the misinformation on the topic which permeates supplier literature, industry journals and, especially, the Internet. Some examples that the author has read in such material or in conference presentations follow:

- I CTI requires that all queue control functions be removed from the PBX and placed onto an external server;
- I PBXs are “proprietary” and PBX development is slow, inhibiting CTI deployment;
- I Telephone companies and PBX vendors have a vested interest in delaying the deployment of CTI;
- I Today’s technology forces users to buy PBXs, CTI hardware and CTI server software from the same supplier;

- I Having the ACD function performed by the PBX has it performed by hardware whereas having it performed by a CTI application is having it performed by software;
- I CTI is incredibly difficult with a PBX but incredibly easy with a PC-based or LAN-based telephone system;
- I If the telephone system offers integral CTI it can be termed “computer telephony”, and no integration of applications is required;
- I CTI can be implemented without any understanding of the organization’s business processes and call flows;
- I Because some switches do not support call progress detection, using this capability of any switch is, and will always be, highly risky;
- I ACD MIS systems, Internet telephony, telecommuting, IVR, fax-back and fax from a PC are all CTI applications;
- I Having voice and data transmitted over different media inhibits CTI;
- I CTI is dead;
- I CTI is a legacy application;
- I As a LAN-based telephone system transmits voice and data through the same infrastructure, they are inherently "convergent" with the result that CTI “just happens”;
- I Implementing CTI instantly improves customer service;
- I CTI was invented or developed by just one company;
- I There were no CTI standards prior to the release of TAPI, and/or TSAPI.

Readers on the enterprise side of the fence are cautioned against believing such misinformation and hesitating to implement CTI as a result.

Amongst the barriers to CTI cited by CTI developers, lack of awareness was the second-most cited factor, with one noting a perception that CTI was a "black art". Related barriers cited were a lack of senior management buy-in, a lack of skilled systems integrators, a lack of good consultants and the need to adopt new processes. Given the barrier presented by the lack of awareness, readers on the vendor side of the fence are thus cautioned against creating and disseminating such misinformation, almost all of which has come from vendors!

*An informed market buys wisely*

*A confused market buys the well known, if at all.*

## 6 THE FUTURE OF CTI

### 6.1 Uptake of CTI

The Computer Telephony Integration: from the Internet to the Desktop, in North America report included estimates of the penetration of CTI in call centers in North America ranging from 10% to 35%. Given the paucity of data, the lack of a consistent measures of what is actually being surveyed and wide ranges in estimates of the numbers of call centers in several countries, this update report has not attempted to update such figures.

Nonetheless, two observations can be made. First as the 2004-5 sales were equivalent to about 20% of the installed base, using agent license numbers, CTI software sales are certainly buoyant. And although the call center market is probably still growing, albeit quite modestly as increased demand is countered by offshore outsourcing, this sales volume does not represent a corresponding increase in CTI penetration as some of these sales will be to sites that had been using an alternative product.

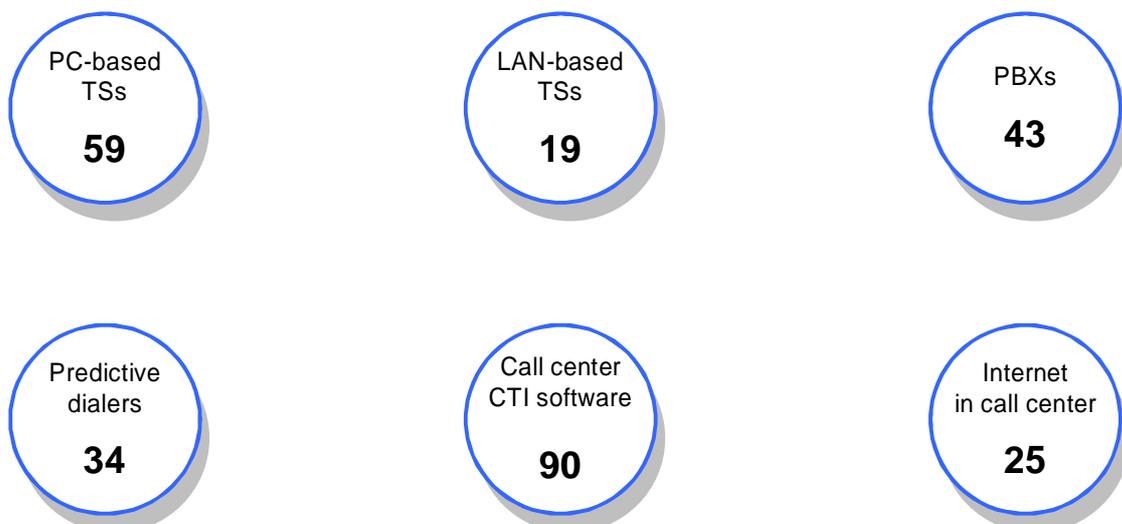
The second point to be made concerns unused licenses. The installed bases of CTI licenses for the nine North American markets represent, based on the 2003 numbers of call center agent positions reported in Computer Telephony Integration: from the Internet to the Desktop, in North America and assuming no net growth, a CTI software penetration rate of about 40%. Clearly, some of the licenses sold are not being used.

## 6.2 Product Directions

### 6.2.1 Call Center Infrastructure

Each product category in the CTI product mosaic is undergoing change, albeit evolutionary change. Some changes, as discussed in the following section, concern market directions and pressures and others concern technology. The following three diagrams illustrate the numbers of products in each of six product categories in 1999, 2003 and 2006 and the movements in and out of and between these years.

Figure 12 - Product Landscape in 1999





## Explanatory Notes

|                                       |   |
|---------------------------------------|---|
| Vendor acquired, product retained     | This refers to instances when a developer of products in the one category is acquired by another and the products continue to be developed, yet there is one fewer developer of products in that category.            |
| Vendor acquired, product incorporated | This refers to instances when a developer of products in the one category is acquired by a company that has incorporated the products in question into its existing products, but not as products in their own right. |
| VoiceXML, CRM, ASP                    | This refers to companies who have transformed from developing products in the given categories to the product or business in question.  |
| 1*                                    | Where the asterisk appears, the company has expanded the scope of one product so that it subsequently belongs in both the former and the new category.  |

The number of vendors of PBXs, PC-based telephone systems and especially CTI software suggest a fragmented market ripe for consolidation to the point of begging the question as to why such consolidation has not yet taken place.

Yet is the market abnormally unconsolidated? Compared to mainframe computer manufacturing and desktop operating system software, for which IBM and Microsoft hold near monopolies, the CTI software market is extraordinarily fragmented. But it is these markets, not that of CTI software, that are the exceptions.

### 6.2.2 Call Center/Desktop CTI

Although things have quieted during the past two years compared to the period between 1999 and 2003 as illustrated in Figures 12-14, the field of call center CTI software remains a dynamic one. Despite use of one of three server operating systems and almost universal use of Intel-based servers, CTI software is still a complex product, not a commodity. Attempts to proclaim out-of-the-box functionality, until all businesses are the same and use identical enterprise computer applications, there will always be a considerable degree of customized implementation requiring professional services by those who know the CTI software product, and know it well.

Nonetheless, 73 products available worldwide and 36 in North America appears to be quite a number, suggesting a fragmented market ripe for consolidation. However, as dynamic as the market is, there are a number of factors which prevent significant consolidation, at least in the near future.

To begin with, despite their support of standard CTI protocols, the actual support of such protocols by PBXs is anything but standard with development of full integration to any one PBX a significant effort on the part of CTI software developers. The 73 call center CTI software products have been interfaced to, on average, eight PBXs each. As long as there are a number of PBXs on the market,

there will be a number of call center CTI software products.

A second factor concerns the nature of call center CTI software itself which is, although the term itself has not been used in this report, middleware software. It thus doesn't actually perform that many functions itself, but co-ordinates the functions performed by and messages between the telephone systems, desktop software and enterprise computer application software. In this position, an enterprise is more likely to replace its telephone system and/or enterprise computer application to meet its changed needs, and simply interface to new system to the existing CTI software.

From the vendor's perspective, having developed a call center CTI software product, although the developer must migrate it to the latest versions of the server and desktop operating systems and update interfaces to the supported enterprise computer applications and databases, compared to what is necessary to develop, say, CRM software to keep up with its competitors, this effort is modest. Thus, once CTI software has been developed, the recurring cost of keeping it current is modest.

This, coupled with the relatively low replacement rate, enables developers of CTI software with modest installed bases to remain in business.

Yet another factor concerns the level of systems integration work involved with the installation of such a system which requires local presence. While some vendors have been successful in the many countries around the world, the requirement for local offices and/or local partners reduces the economies of scale compared to many other products. That there are companies such as IntraNext with a strong focus on a specific vertical market and others with a strong focus on their local market will ensure that the CTI software market does not consolidate to anything like a dozen international companies for the foreseeable future.

Nonetheless, while these factors inhibit consolidation, vendors cannot afford to be complacent. Products that support only a limited number of CTI protocols and PBXs are vulnerable to a falling from favor of those PBXs and/or those that support the protocols. Developers of CTI software need to keep abreast of the PBX market shares for both sales and installed base, and to be able to interface to the PC-based and especially LAN-based telephone systems which taking a greater share of the telephony market.

While many customers will not require CTI software to incorporate an IVR, predictive dialer and e-mail management components, etc., there will be those that will. Developers of CTI software that don't offer such capabilities will thus be faced with the choice of developing them, or buying such capabilities wholesale from specialists that do. This market is embryonic, but it will emerge.

Correspondingly, Envoy's CT-Connect software is widely used by developers of predictive dialers, CRM software, audio call recording systems etc. as well as other CTI products as the core CTI engine. It is astonishing that no other developer of CTI software appears to have the slightest interest in challenging Envoy in this space. Nothing breeds complacency as does limited short-term

success.

Developers of CTI software were informally polled on their forecasts for their respective products three years hence. Four vendors cited a current or planned support of extensions connected directly to the CTI server using IP circuits although this would also require telephony circuits between the server and PBX. UK-based Rostrvm has taken this a step further by evolving their Rostrvm Suite to be able to be deployed either as a LAN-based telephone system or as CTI software. Two vendors made reference to CRM but whether they were planning to interface to more CRM products or evolve their product to be a CRM product was ambiguous. Three vendors are planning to support more PBXs. Three plan to add capabilities, one specifically being the development of off-switch ACD. Amongst the other plans were for geographic expansion, integration with specific application software, implementation of browser interfaces, price reduction and being offered as an ASP.

What is notable from the above is that the planned enhancements, and many vendors didn't note any, vary widely. If anything is clear, is that, from the vendors' perspective, there is not one single direction for in which this category of product is evolving. Below are the author's forecasts for the development of this product category.

- 1 While some products will continue to offer only the basic capabilities, the percentages of products offering the above optional capabilities will increase, albeit slowly.
- 2 While some vendors will develop and promote what is claimed to be an out of the box capability, by screen popping a telephony window or soft phone displaying the number and name of the caller but not much else, all products will continue to allow comprehensive screen pop/screen fill and the capability for other applications to be developed.
- 3 Although a few IVR systems and CRM products will continue to offer a CTI capability, users will generally continue to prefer to have CTI capability provided by CTI products.
- 4 Although a slight majority of the CTI products available in this market include an off-switch ACD capability, this will continue to be offered as an option allowing it to not be used in call centers using PBXs with comprehensive ACD capability.
- 5 More applications for this technology will be developed outside of the call center.
- 6 Vendors will also increasingly offer more flexible licensing arrangements to allow applications to cost effectively be deployed outside of the call center.

### **6.3 Market Directions**

As evidenced by continuing CTI software sales, new products and ongoing product development, the market is enjoying healthy growth.

At the same time, the deployment of CTI applications must be seen against a background of increased outsourcing and, particularly in manufacturing, a trend of

reducing the number of suppliers with which a major organization must deal. By using a call center/desktop CTI application or a PC-based or LAN-based telephone system that offers a broad package of capabilities such as IVR, the operator of a call center is able to deal with just the one supplier. But the offering of such integral capabilities does raise the question of whether or not the supplier is itself sticking to its own core competency. Hence, while developers of such systems will continue to offer such multi-module products, only some using organizations will use only these products.

Still on competency, there is the issue of application maintenance. When IVRs were first introduced in the late 1980s, their suppliers undertook all development on behalf of the using companies. And although many call centers still have the vendor perform application maintenance, a significant proportion instead do their own. CTI applications will surely follow a parallel path with application maintenance increasingly performed by the using organizations, or their outsourcers.

But there is another parallel with IVRs. Although there are a few IVR systems that can be configured by filling in basic forms, virtually all host applications custom developed for the using organization, although many of these applications are fairly basic. Some vendors of CTI software are attempting to create configurable “out-of-the box” applications that can simply be configured, presumably by filling in basic forms, but such one-size-fits all pseudo-applications just won’t cut it.

## 7 GLOSSARY

The field of information technology is renown for its own language. There are countless terms and acronyms unique to the field as a whole, in addition to those specific to each vendor. Beyond the multiplicity of terminology unique to the field, there are many terms which mean different things to different persons. A number of such terms relevant to the broad field of CTI follow, with an explanation of their usage in this report.

**ACD** An automatic call distributor (ACD) function manages the queuing of calls and their assignment to agents and is covered in section 4.3. Most telephone systems and many CTI products offer an ACD capability.

**ACD MIS** An ACD management information system (MIS) is a system adjunct to an ACD to provide real-time and historic reporting.

**ANI** Automatic number identification (ANI) is the transmission of the number of the telephone service from where the call was initiated to the called telephone system.

**API** An applications program interface (API) is a computer application interface that provides programming abstraction for call processing to such an application.

**Audio Call Recording System** Audio call recording systems are used to record calls received by call centers for a variety of applications. This term is used in

preference to call logging or call recording which may be interpreted to refer to the collection of call statistics, but not the audio component of the calls.

**Audiotext** An application performed by IVR systems that provides recorded information to callers.

**Auto-attendant** An application performed by IVR systems that gives callers a choice of options, each of which results in the call being assigned to a queue or skill group for that subject area.

**Call Blending** Call blending is a capability of a predictive dialer or e-mail management system to blend outbound calls or e-mails with inbound calls and possibly contacts from other channels.

**Call Logging** Call logging is a form of audio call recording involving the recording of all calls.

**CallPath** A defacto standard CTI protocol developed by IBM.

**Call Progress Detection** Call progress detection is the capability of a PBX or hardware predictive dialer to track call progress by receiving network signaling and, if a PBX, pass it to the dialer.

**CCITT** The former Comite Cosultatif Internationale de Telegraphique et Telephonique has been renamed the ITU-T.

**Central Office Exchange** A central office exchange is a telephone exchange operated by a telephone company to provide a service to subscribers. This term is more specific than the term exchange.

**Centrex** A service provided by some telephone operating companies to provide a package of facilities on a set of subscriber lines comparable to that which what would be provided by a PBX.

**CLI** Calling line identification (CLI) is a term widely used outside of North America for ANI.

**Click-to-talk** The icon on an Internet site used to initiate a collaborative browsing session.

**Collaborative Browsing** An application by which an Internet site visitor and call center agent speak while they view the same pages on that organization's Internet site.

**Convergence** Having voice and data carried through common infrastructure is convergence although some vendors claim that by doing so, CTI applications just happen.

**CND** Calling number display (CND) is a less-widely-used term for CLI.

**CPE** Customer-premises equipment (CPE) is telecommunications equipment that is located on the customer's premises.

**CRM** Customer relationship management (CRM) is both a business philosophy and software package that supports the processes of liaising with customers and potential customers, tracking contacts from customers and/or of analyzing such contacts in a background mode. However, some vendors of a products ranging from audio call recording systems to e-mail processing software spuriously claim their products to be CRM products.

**CSTA** Computer Supported Telecommunication Application (CSTA) is the original and only *de jure* international CTI standard.

**CT** Computer telephony (CT). Applications which integrate computing and telephony functions. A complete discussion of the terms CT and CTI, and the implications of these terms appears in section 3.1.

**CTI** Computer telephony integration (CTI) is the integration of computing and telephony systems and applications to enable, or improve the functionality of, applications compared to what such applications provide in the absence of such integration.

**DDE** Dynamic Data Exchange (DDE) is a Microsoft communications protocol for transferring data from one computer program to another, either on the same machine or over a LAN.

**DNIS** Dialed number identification service (DNIS) is the indial number on which an incoming call, for which the caller dialed a toll-free number, is received.

**DTMF** Dual-tone multifrequency (DTMF) is the technical term for the tones generated by a touch-tone handset.

**E-commerce** The performance of commerce, ie. sales, from an Internet site, typically without the participation of persons at the selling company.

**eCRM** A vendor-created term that generally refers to products to provide sales and fulfillment for Internet sites. As such products service contact from only one channel, they are not CRM products.

**ECMA** The European Computer Manufacturers' Association (ECMA) is a body which is an active participant in the overall standards development process.

**ECTF** The Enterprise Computer Telephony Forum (ECTF) is a now-dormant industry forum established to formalize defacto standards.

**Enterprise Computing Applications** Enterprise computing applications are computing applications typically residing on mainframe computers performing functions used by the organization as a whole. Also see legacy computer systems.

**ETSI** The European Telecom Standards Institute (ETSI) is a standards setting body.

**Exchange** See central office exchange.

**H.100** A defacto standard for the integration of telephony circuit cards into a computer chassis first issued by the ECTF as part of its CT Framework in 1996 to provide a standard to replace the mutually incompatible MVIP and SCSA.

**H.323** H.323 is a protocol that defines specifications for transmitting real-time voice, video and data over networks that do not offer guaranteed service or quality of service and is thus used by most LAN-based telephone systems.

**IP Contact Center** An ambiguous term implying a contact center using a LAN-based telephone system with ACD capability, a PBX/ACD with IP circuits or one that supports only collaborative browsing.

**IP PBX** An ambiguous term that is sometimes used to refer to PC-based or LAN-based telephone systems.

**IVR** Interactive voice response (IVR) systems, although technically applications of CTI, are not seen by the market to be CTI.

**ISDN** Integrated services digital network describes a class of digital accesses to the public telephone network.

**ITU-T** International Telecommunications Union, Telecommunications. A unit of the United Nation charged with the development and adoption of telecommunications standards to ensure compatibility of telecommunications facilities between countries. The ITU-T was formerly known as the CCITT.

**JTAPI** Java Telephony API (JTAPI) is an application programming interface for computer-telephony applications written in JavaSoft.

**LAN-based Telephone System** A telephone system comprised of telephony-enabled PCs on a LAN. LAN-based telephone systems are covered in section 3.3.

**Legacy Computer Systems** The term legacy computer systems is used by some suppliers to inappropriately refer to existing enterprise computers with the implication, often inaccurate, that all such systems are antiquated. This term is not used in this report.

**Legacy** As above, the term is sometimes used by vendors to despairingly refer to all systems an enterprise might currently use.

**LOB Code** A code which is keyed by an agent at the conclusion of a call to classify the subject matter of the call. Tabulation of LOB code entries provides imprecise but useable percentages of calls by subject matter.

**Middleware** Middleware refers to a set of software products that either interface channel-processing systems with enterprise computer applications or enterprise computer-resident applications with each other.

**MVIP** Multi-Vendor Integration Protocol (MVIP) is a defacto standard for the integration of telephony circuit cards into a computer chassis first issued in 1990. Although less popular than SCSA, MVIP is also widely used in IVR, voice mail and audio call recording systems.

**Off-switch ACD** The capability of CTI software to provide an ACD capability for the telephone system to which it is interfaced.

**Open** A totally ambiguous term, the term 'open' is used by some vendors who have chosen to implement their software on widely-used commercially available, albeit proprietary, operating systems.

**Open Architecture** Also an ambiguous term, the term 'open architecture' is used by some vendors that using a PBX's own ACD instead of one provided by a CTI product is somehow closed.

**PBX** A private automatic branch exchange (PBX) is a telephone switch resident on a using organization's premises with extensions and trunks. Such systems are referred to as PABXs (private branch exchanges) in some countries.

**PC** In this report, a PC is a personal computer that resides on one desk and is used by one user at one time. PCs may use any of the Windows, Linux, Unix and MacIntosh operating systems.

**PC-based Telephone System** A telephone system using a server as the chassis.

**PCX** An alternative term for PC-based telephone systems.

**Power Dialing** The process of generating outbound calls that involves the dialer waiting for an agent to complete a call before the next call attempt is initiated, but which presents only answered calls to agents.

**Predictive Dialing** The process of generating outbound calls that involves the dialer generating outbound call attempts in advance of agent availability at a rate self-set to minimize both agent idle time and calls being answered without an available agent. Only answered calls are presented to agents.

**Preview Dialing** The process of successively presenting call information to an agent to preview before initiating an outbound call to that party.

**Proprietary** Proprietary refers to anything covered by copyright, trademark or patent. Within the field of communications, the term proprietary is also widely used to distinguish protocols owned by one vendor from those released by international organizations or industry bodies. The term is, however, misused by some vendors as a slight against competing products using operating systems and software platforms that are not as widely used as others.

**PSTN** Public switched telephone network.

**Quality Monitoring** Quality monitoring is a form of audio call recording involving the selective recording of calls for agent evaluation.

**S.100** A set of computer telephony APIs within the ECTF's CT Framework which allocate, configure, and operate hardware resources in a client-server model.

**S.200** A client-server application layer protocol within the ECTF's CT Framework which defines messages between the client application and resource server, designed to work with S.100 APIs.

**S.300** A service provider interface (SPI) specification within the ECTF's CT Framework which provides standard messaging for the server to control media processing and switching.

**S.900** A specification which defines CT services management including configuration, performance, statistics management and fault management within the ECTF's CT Framework.

**SCAI** Switch-Computer Applications Interface (SCAI) is a standard CTI protocol issued by the American National Standards Institute.

**Screen Fill** Screen fill is the process of filling a popped screen with caller-specific data without which screen pop is of limited use. Screen pop and screen fill are discussed in section 4.1.1.

**Screen Pop** Screen pop is the presentation of a screen specific to the caller and/or subject matter of the call when the call is presented to the agent.

**Screen Transfer with Call Transfer** This self-explanatory function is discussed in section 4.1.2.

**SCSA** Signal Computing System Architecture (SCSA) is a defacto standard for the integration of telephony circuit cards into a computer chassis first issued in 1993.

**SIP** Session Initialization Protocol (SIP) is a standard for signaling communications services on the Internet.

**Skill-based Routing** A widely-used but confusing term generally referring to the process of assigning calls to agents according to one or more agent-specific attributes. A more appropriate term would be skill-based call assignment.

**Softphone** An application of some CTI software products which can provide a telephony window, a soft wallboard and/or an ersatz screen pop function.

**Switch** In this report, this term refers to central office exchanges with a centrex service, PBXs, PC-based telephone systems and LAN-based telephone systems.

**TAPI** Telephony Application Programming Interface (TAPI) is a defacto standard CTI protocol.

**Telephony Window** A telephony window is a capability many PC-based and LAN-based telephone systems offer to provide a more feature-rich person to system interface than that offered by the telephone handset.

**Text Chat** A means by which an Internet site visitor and call center agent engage in a dialogue by exchanging typed text.

**TSAPI** Telephony Services Application Programming Interface (TSAPI) is a defacto standard CTI protocol.

**Universal Queue** A marketing department-created term for having contacts from more than one media managed by a single queuing system.

**UnPBX** A term covering both PC-based and LAN-based telephone systems.

**UnPBX** See UnPBX.

**Versit** Versit is a now-dormant industry forum established to formalize defacto standards.

**VoIP** The transmission of voice over an IP network, which is irrelevant to CTI.

**VRU** A voice response unit (VRU) is a less-widely-used alternative term for an IVR.

**Wrap-up Code** An alternative name for a LOB Code.

**Web-based PBX** A nonsensical term implying a PBX based in the Internet. Likely to refer to a telephone system supporting email management and/or collaborative browsing, one supporting a browser-based softphone or one using a browser-based configuration facility.

**Web Chat** An alternative name for text chat.

## 8 VENDOR DIRECTORY

### [Altitude Software Ltd.](#)

<http://www.altitude.com>

19 Allstate Parkway, Suite 125 Markham, Ont L3R 5A4, Canada

Phone (905) 479 2655

Fax (905) 479 3825

E-mail [info.ca@altitude.com](mailto:info.ca@altitude.com)

Product Altitude uCI (Unified Customer Interaction)

Classification Call center CTI software that performs screen pop, screen transfer

with call transfer, screen/keyboard dialing, call routing and optional IVR, predictive dialing, scripting, audio call recording, collaborative browsing using both voice through the Internet and callbacks, routing of e-mails to agents and off-switch ACD.

CTI protocols supported

Third-party CSTA, TAPI v2.1 and TSAPI

**Amcom Software, Inc.**

<http://www.amcomsoft.com>

5555 West 78th Street Minneapolis, Minn 55439 USA

Phone (952) 946 7722

Fax (952) 946 7700

E-mail [sales@amcomsoft.com](mailto:sales@amcomsoft.com)

Product CTI Middleware

Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing, call routing, and optional IVR, predictive dialing and limited audio call recording, based on Envov's CT-Connect.

CTI protocols supported

Third-party TAPI v2.1

**Apropos**

<http://www.apropos.com>

| <b><u>Head office</u></b>                                     | <b><u>Canadian representative</u></b>                         |
|---|---|
| One Tower Lane, 28th Floor Oakbrook Terrace, Ill 60181 USA    | LGS, 1220 Sheppard Avenue East Suite 300 Toronto, Ont M2K 2S5 |
| Phone (630) 472 9600  | Phone (416) 718 3456  |
| Fax (630) 472 9745  |   |
| E-mail <a href="mailto:info@apropos.com">info@apropos.com</a> | E-mail <a href="mailto:imsinfo@lgs.com">imsinfo@lgs.com</a>   |

Product Apropos Interaction Management Suite (IMS), version 5

Classification An IVR/CTI system that controls call queuing and performs screen pop, screen transfer with call transfer, screen/keyboard dialing, call routing, and optional power dialing, collaborative browsing using both voice through the Internet and callbacks, routing of e-mails to agents, text chat and off-switch ACD.

CTI protocols supported

Third-party CSTA and TAPI v2.1

**ARC Solutions Ltd.**

<http://www.arcsolutions.com>

5&6 Bourne Court, Southend Road, Woodford, Essex, IG8 8HD, UK

ARC Solutions is based in Woodford, Essex, UK. ARC Solutions's CTI software is distributed exclusively in North American by Netelligent.

## Aspect Communications

<http://www.aspect.com>

| <u>Head office</u>                                   | <u>Canadian office</u>                                    |
|--|---|
| 6 Technology Park Drive, Westford,<br>Mass 01886 USA | 2680 Skymark Avenue Suite 400<br>Mississauga, Ont L4W 5L6 |
| Phone (978) 952 0882                                 | Phone (905) 602 2500                                      |
| Fax (978) 952 0201                                   | Fax (905) 624 9386  |

E-mail [info@aspect.com](mailto:info@aspect.com)

Product Aspect Enterprise Contact Server

Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing, call routing and optional predictive dialing, collaborative browsing using both voice through the Internet and callbacks, text chat and off-switch ACD.

CTI protocols supported

Third-party CSTA, Application Bridge (proprietary to Aspect), ASAI (proprietary to Avaya), MeridianLink (proprietary to Nortel) and Transaction Link (proprietary to Aspect)

Language English

Product Uniphi

Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing, call routing and optional voice mail, IVR, collaborative browsing using both voice through the Internet and callbacks, routing of e-mails to agents and off-switch ACD designed for LAN-based telephone systems.

CTI protocols and APIs supported

Third-party CSTA, ASAI (proprietary to Avaya), MeridianLink (proprietary to Nortel) and Transaction Link (proprietary to Aspect)

## Avaya Inc.

| <u>Head office</u>                                      | <u>Canadian office</u>                                |
|---|---|
| <a href="http://www.avaya.com">http://www.avaya.com</a> | <a href="http://www.avaya.ca">http://www.avaya.ca</a> |
| 211 Mt. Airy Road., Basking Ridge, NJ<br>07920 USA      | 1380 Rodick Road Markham, Ont L3R<br>4G5              |
| Phone (908) 953 6000                                    | Phone (905) 474 6000                                  |

E-mail [canmarketing@avaya.com](mailto:canmarketing@avaya.com)

Product Avaya Computer Telephony (formerly Passageways)

Classification Call centre CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing and call routing and optional predictive dialling, collaborative browsing using both voice through the Internet and callbacks, routing of e-mails to agents and text chat.

CTI protocols supported

Third-party CSTA, JTAPI, TSAPI and ASAI (proprietary to Avaya)

## Castel

<http://www.castel.com>

100 Cummings Center Suite 157H, Beverly, Mass 01915 USA  
 Phone (978) 236 1000  
 Fax (978) 236 1197  
 E-mail [info@castel.com](mailto:info@castel.com)  
 Product DirectQuest  
 Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing, call routing and optional predictive dialing and off-switch ACD.  
 CTI protocols supported  
 Third-party CaMPS (Communications and Media Protocol Server) (proprietary to Castel)

### Cisco Systems Inc.

<http://www.cisco.com>

| <u>Head office</u>                               |                | <u>Canadian office</u>  |                |
|--|----------------|---|----------------|
| 170 West Tasman Drive, San Jose, Calif 95134 USA |                | 181 Bay Street, Suite 3400, Bay Wellington Tower, BCE Place, Toronto, Ont M5J 2T3 |                |
| Phone  | (408) 526 4000 | Phone   | (416) 306 7000 |
| Fax  | (408) 526 4100 | Fax   | (416) 306 7099 |

Email [cs-rep@cisco.com](mailto:cs-rep@cisco.com)  
 Product ICM  
 Classification Call center CTI software that can be deployed in a carrier network to control call routing in the carrier network prior to connection of the call to the call centres and which performs screen pop, screen transfer with call transfer, screen/keyboard dialing, call routing and optional collaborative browsing using both voice through the Internet and callbacks and routing of e-mails to agents.  
 CTI protocols supported  
 Third-party CSTA, JTAPI, TAPI v2.1, ASAI (proprietary to Avaya), OAI/Infolink (proprietary to NEC), MeridianLink (proprietary to Nortel) and Transaction Link (proprietary to Aspect)

### Collaboration Technologies

<http://www.collaborationtechnologies.co.uk>  
 3081 California Avenue Oakland, Calif 94602 USA  
 Phone +1 510 482 6052  
 E-mail [administration@collaborationtechnologies.co.uk](mailto:administration@collaborationtechnologies.co.uk)  
 Product Realise  
 Classification Call center CTI software that performs screen pop, screen transfer with call transfer and call routing, and optional IVR, predictive dialing, collaborative browsing using callbacks and off-switch ACD, based on Envov's CT-Connect.  
 CTI protocols supported  
 Third-party CSTA, JTAPI, TAPI v2.1, TSAPI, ASAI (proprietary to Avaya) and MeridianLink (proprietary to Nortel)

### Computer Telephony Solutions, Inc.

Computer Telephony Solutions did not respond to a brief set of questions for inclusion in this report that were emailed repeatedly over a four-month period.

### ComTek International Inc.

<http://www.comtek-intl.com>

1745 Shea Center Drive, Suite 400, Highlands Ranch, Col 80129 USA

Phone (720) 344 4844

Fax (303) 470 7725

E-mail [sales@comtek-intl.com](mailto:sales@comtek-intl.com)

Product Computer Telephony Integration System (CTIS)

Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing, call routing, and optional IVR, predictive dialing and audio call recording with screen capture.

CTI protocols supported

Third-party CSTA, SCAI, TAPI v2.1, TSAPI, ASAI (proprietary to Avaya), OAI/Infolink (proprietary to NEC) and MeridianLink (proprietary to Nortel)

### CTI Lab

CTI Lab is a subsidiary of NextiraOne LLC. CTI Lab declined to answer the brief set of questions for inclusion in this report.

### DAC Systems

DAC Systems did not respond to a brief set of questions for inclusion in this report that were emailed repeatedly over a four-month period.

### Easyrun

<http://www.easyrun.com>

150 Intracoastal Pointe Drive, Suite 306 Jupiter, Fla 33477 USA

Phone (561) 743 0400

Fax (561) 743 4701

E-mail [info@easyrun.com](mailto:info@easyrun.com)

Product EPICCenter

Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing, call routing, and optional IVR, predictive dialing, audio call recording, collaborative browsing using both voice through the Internet and callbacks, routing of e-mails to agents and off-switch ACD.

CTI protocols supported

Third-party CSTA, TAPI v2.1, TSAPI and JTAPI

## Envox

<http://www.envox.com>

2000 West Park Drive, Westborough, Mass 01581, USA

Phone +1 508 898 2600

Fax +1

E-mail [us.sales@envox.com](mailto:us.sales@envox.com)

Product CT-Connect

Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing and call routing.

CTI protocols supported

Third-party CSTA, SCAI, TAPI v2.1, ASAI (proprietary to Avaya), OAI/Infolink (proprietary to NEC) and MeridianLink (proprietary to Nortel)

## Telefon AB LM Ericsson

| <u>Canadian office</u>                                      | <u>USA office</u>   |
|---|---|
| <a href="http://www.ericsson.ca">http://www.ericsson.ca</a> | <a href="http://www.ericsson.com">http://www.ericsson.com</a> |
| 5255 Satellite Drive, Mississauga Ont L4W 5E3               | 6300 Legacy Drive, Plano, Tex 75024-3607                      |
| Phone (905) 629 6700  | Phone (858) 332 5900  |
| Fax (905) 629 6701  | Fax (212) 213 0159  |

E-mail [enterprise.northamerica@ebc.ericsson.se](mailto:enterprise.northamerica@ebc.ericsson.se)

Product CCM

Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing and call routing, and optional IVR and audio call recording, specifically designed to work with the MD110 PBX.

CTI protocols supported

Third-party CSTA, TAPI, v2.1 and TSAPI

Product Solidus

Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing and call routing, IVR, and optional audio call recording, collaborative browsing using callbacks, routing of e-mails to agents, text chat and off-switch ACD, specifically designed to work with the MD110 PBX.

CTI protocols supported

Third-party CSTA

## Frank Solutions Inc.

Frank Solutions did not respond to a brief set of questions for inclusion in this report that were emailed repeatedly over a four-month period.

## Genesys Telecommunications Labs Inc.

Genesys did not respond to a brief set of questions for inclusion in this report that were emailed repeatedly over a four-month period.

## Inter-Tel

<http://www.inter-tel.com>

1615 South 52nd Street, Tempe, Ariz 85281 USA

Phone (480) 449 8900

Fax (480) 449 8901

E-mail [contactsales@inter-tel.com](mailto:contactsales@inter-tel.com)

Product Call Center Suite

Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing, call routing, and optional routing of e-mails to agents and historical and real time reporting.

CTI protocols supported

Third-party CSTA and OAI (proprietary to Inter-Tel)

## Intervoice

Intervoice, and before that Edify which was acquired by Intervoice coincidentally with the preparation of this update report, did not respond to a brief set of questions for inclusion in this report that were emailed repeatedly over a four-month period.

## IntraNext Systems

<http://www.nextsys.com>

391 Inverness Parkway Suite 111 Englewood, Col 80112 USA

Phone (303) 799 0771

Fax (720) 873 6575

E-mail [sales@nextsys.com](mailto:sales@nextsys.com)

Product NextSys suite

Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing and call routing.

CTI protocols supported

Third-party CSTA, TAPI v2.1, OAI (proprietary to Aastra), Application Bridge (proprietary to Aspect), ASAI (proprietary to Avaya), MeridianLink (proprietary to Nortel) and Transaction Link (proprietary to Aspect)

## Line 4

<http://www.line-4.com>

1320 Harbor Bay Parkway, Suite 180, Alameda, Calif 94502 USA

Phone (510) 748 1500

Fax (510) 748 1534

E-mail [cti@line-4.com](mailto:cti@line-4.com)  
Product ActionSuite (formerly named Dynarep)  
Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing, call routing, IVR, caller-requested callback as well as optional collaborative browsing using callbacks and text chat.  
CTI protocols supported  
Third-party CSTA, TAPI v2.1, Application Bridge (proprietary to Aspect) and ASAI (proprietary to Avaya)

### Mediatek Data SRL

<http://www.dialogic.ro> (Romanian only)  
Bd Cuza, nr 9 Bucharest, sector 1 Romania  
Phone +40 21 312 3454  
Fax +40 21 212 5282  
E-mail [info@dialogic.ro](mailto:info@dialogic.ro)  
Product MediaCallCenter  
Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing, call routing, and optional IVR, audio call recording, routing of e-mails to agents and off-switch ACD.  
CTI protocols supported  
Third-party CSTA  
MediaCallCenter is distributed in the USA by distributors.

### Microlog

Microlog did not respond to a brief set of questions for inclusion in this report that were emailed repeatedly over a four-month period.

### Netelligent

<http://www.netelligent.com>  
400 South Woods Mill Drive, Suite 105, Saint Louis, Missouri 63017, USA  
Phone (314) 392 6900  
Fax (314) 754 9760  
E-mail [sales@netelligent.com](mailto:sales@netelligent.com)  
Product Arc Connect from ARC Solutions  
Classification Call centre CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialling, call routing, collaborative browsing using voice through the Internet, text chat and optional off-switch ACD, targeted at SMEs using PC-based and LAN-based telephone systems.  
CTI protocols supported  
Third-party TAPI v2.1

## Network Programs

<http://www.networkprograms.com>

1430 Armitage Way, Mechanicsburg, Penn 17050, USA

Phone (717) 728 8811

Fax (717) 728 8887

E-mail [futin@networkprograms.com](mailto:futin@networkprograms.com)

Product NetRelations suite

Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing, call routing, and optional IVR, predictive dialing, audio call recording, basic routing of e-mails to agents, collaborative browsing using callbacks, text chat and off-switch ACD.

CTI protocols and APIs supported

Third-party CSTA and TSAPI

## Predict Ability Plus, Inc.

<http://www.paplus.com>

100 Laurel Lane, Lunenburg, Mass 01462 USA

Phone (978) 343 6000

Fax (978) 345 9179

E-mail [sales@paplus.com](mailto:sales@paplus.com)

Products PAPLUS Predictive Dialer

Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing, call routing, and optional predictive dialing, audio call recording, collaborative browsing, routing of e-mails to agents.

CTI protocols supported

Third-party CSTA, SCAI, TAPI v2.1, TSAPI, ASAI (proprietary to Avaya), OAI/Infolink (proprietary to NEC) and MeridianLink (proprietary to Nortel)

Note that the PAPLUS Predictive Dialer is distributed in Canada by distributors.

## QGate

<http://www.qgate.co.uk>

QGate is based in Fareham, Hampshire, UK. QGate's CTI software is distributed exclusively in North American by QGate Software.

## QGate Software

<http://www.qgatesoftware.com>

212, 2843 East Grand River, East Lansing, Mich 48823 USA

Phone (517) 699 7008

Fax (517) 913 6033

E-mail [info@qgatesoftware.com](mailto:info@qgatesoftware.com)

Product intelli-Cti from QGate

Classification Call center CTI software that performs screen pop, screen transfer with call transfer and screen/keyboard dialing.

CTI protocols and APIs supported

Third-party CSTA, TAPI v2.1 and TSAPI

### Quality Call Solutions, Inc.

<http://www.quality.com>

3003 Bunker Hill Lane, Suite 202, Santa Clara, Calif 95054 USA

Phone (408) 367 8800

Fax (408) 367 8804

E-mail [sales@quality.com](mailto:sales@quality.com)

Product QCall

Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing, call routing etc. using an IBM CallPath/6000 platform.

CTI protocols and APIs supported

Third-party CallPath, CSTA and ASAI (proprietary to Avaya)

### Servion Global Solutions

<http://www.servion.com>

29, Emmons Drive Suite, E-30, Princeton, NJ 08540, USA

Phone (609) 987 0044

Fax (609) 987 8797

E-mail [usa@servion.com](mailto:usa@servion.com)

Product RAP

Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing and call routing and optional IVR, power dialing, collaborative browsing via callbacks and routing of e-mails to agents (by incorporating the Talisma eCRM Suite from Talisma), based on Envov's CT-Connect.

CTI protocols supported

Third-party CSTA, ASAI (proprietary to Avaya) and MeridianLink (proprietary to Nortel)

### Spanlink Communications

Spanlink did provide responses to a brief set of questions for inclusion in this report that were emailed repeatedly over a four-month period.

### Tadiran Telecom Inc.

Tadiran Telecom did not respond to a brief set of questions for inclusion in this report that were emailed repeatedly over a four-month period.

## Teltronics Inc.

<http://www.teltronics.com>

2150 Whitfield Industrial Way, Sarasota, Fla 34243 USA

Phone (941) 753 5000

Fax (941) 751 7729

E-mail [webmaster@teltronics.com](mailto:webmaster@teltronics.com)

Product OMNIWorks

Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing, call routing and optional IVR, collaborative browsing, routing of e-mails to agents and off-switch ACD, designed to work with the 20-20 PBX and the Cypreon LAN-based telephone system.

CTI protocols and APIs supported

Third-party Host Interface Link (HIL, proprietary to Teltronics)

## Upstream Works Software Ltd.

<http://www.upstreamworks.com>

7B - 27 Roytec Rd., Woodbridge Ont Canada

Phone (905) 265 1639

Fax (905) 265 2646

E-mail [sales@upstreamworks.com](mailto:sales@upstreamworks.com)

Product eMedia CT

Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing, call routing and optional auto attendant, progressive dialing, collaborative browsing using callbacks and routing of e-mails to agents.

CTI protocols supported

Third-party ASAI (proprietary to Avaya), MiTAI (proprietary to Mitel), Access Link (proprietary to Nortel) and MeridianLink (proprietary to Nortel)

Note that eMedia CT is also distributed in Canada and the USA by distributors.

## Zeacom Inc.

<http://www.zeacom.net>

Suite 204, 1451 Quail Street, Newport Beach, Calif 92660 USA

Phone (949) 833 3080

Fax (949) 252 0469

E-mail [gemail@zeacomus.com](mailto:gemail@zeacomus.com)

Product Q-Master

Classification Call center CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialing, call routing and optional IVR, collaborative browsing using callbacks, routing of e-mails to agents, text chat and off-switch ACD, designed to work with NEC PBXs.

CTI protocols supported

Third-party CSTA, TAPI v2.1, TSAPI and OAI/Infolink (proprietary to NEC)

## **8.1 Vendor and Product Information**

All of the above information has been provided by the developers or resellers of the products listed and although the author has made every effort to verify the accuracy of the information, no guarantees can be made of its accuracy. It should also be noted that some vendors that did provide information did so only after two months of contact whereas other vendors were able to provide the requested information in less than 24 hours. Others had to have CTI explained to them. A product's support of CTI should not be taken as an indication of the selling company's understanding of it. Buyers beware.

## **8.2 Trademarks and Copyrights**

Although the trademark symbol has not been placed next the product name, most if not all of the product names are protected by trademark and/or copyright in at least as many countries as the products are distributed.

# **8 STEPHEN COATES**

Stephen Coates is the director of Occidental Communications Pty Ltd. Stephen has been working in the communications field for more about 20 years, with assignments including the design of voice and data networks, tendering for computing and communications systems, preparing communications strategies, acting as an expert witness in a case of telecommunications fraud and auditing telephone company accounts. During the past eight years, he has largely consulted on call centers.

Stephen is also a telecommunications industry journalist and has written more than 140 articles which have been published in such magazines as CommsWorld, eAccess, Australian Communications, Computer World, Network World, NZ Business, Insight IS, Voice+ Asia Pacific, Business Communications Review, CRM, Telcall, NewScientist and IT Director. He has also presented papers at a number of conferences, presented communications courses for Management Technology Education and Housley Communications, presented a talk for the ABC radio national program Ockham's Razor and appeared on the TV program Bourke's Backyard. A summary of his consulting and writing, and a comprehensive directory of vendors in the communications and call center market appears on his Internet site, [www.occidental.com.au](http://www.occidental.com.au).

Stephen has an honours Bachelor of Science degree from the University of Waterloo in Waterloo, Ontario, Canada, and an MBA from the University of Technology, Sydney, Australia.