

CTI Software: Australasian 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 Australian company iTa with its iBridge product, 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 IP FX, up significantly since 2003. IP FX has the largest share of 2004-5 sales in both Australia and New Zealand, totally dominating the land of the long white cloud with 74%. Avaya came second in both markets.

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

Although, unlike the [Computer Telephony Integration: from the Internet to the Desktop](#) report in which they were analysed at some depth, PC-based and LAN-based telephone systems and PABXs 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 centres, 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 PABX, 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 dialling 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 analysed at some length in the [Computer Telephony Integration: from the Internet to the Desktop](#) reports, are beyond the scope of this update report as are such product categories as audio call recording systems, predictive diallers, 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, the reader is referred to the above-cited report. For as well as a directory of the products available in the Australasian market, the reader is referred to the author's internet site, www.occidental.com.au.

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 diallers 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 customised for the requirements of the using organisation. So must all other applications of CTI such as screen-based and keyboard-based dialling and semi-automatic collection of line-of-business codes.

Every application integration must be designed, scoped, designed in detail and implemented, using specialised labour. 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.

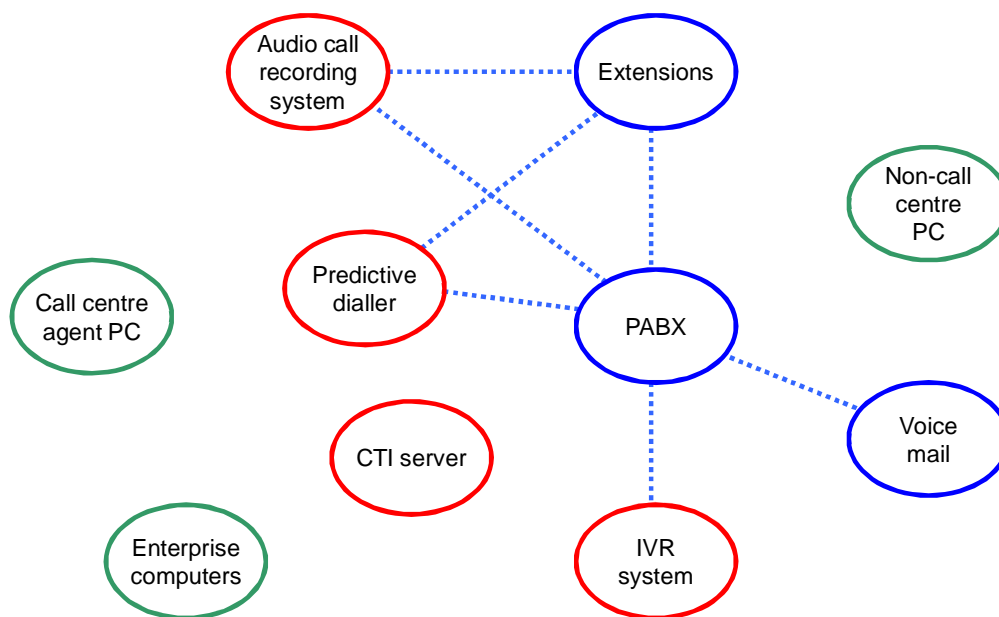
When an integral CTI capability is offered by a telephone system, unsuspecting buyers can be hoodwinked into believing that the integration has already been taken care of. It hasn't. Except for the almost trivial CTI applications such as soft phone, CTI applications require integration of the telephony 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 PABX'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

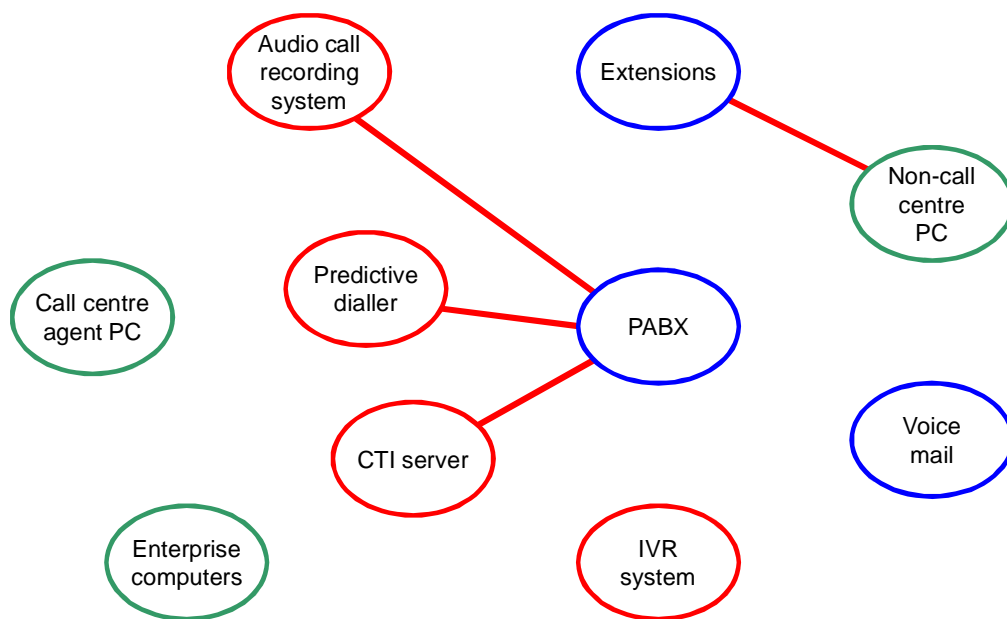


Figure 3 - Logical Architecture I Illustrating Computing Links

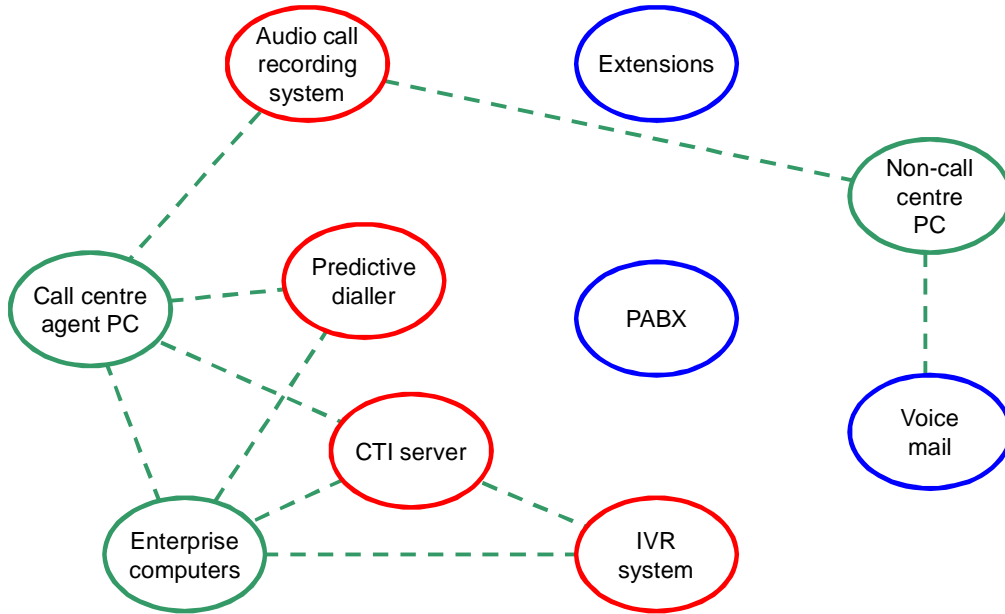


Figure 4 - Logical Architecture I Illustrating All Links

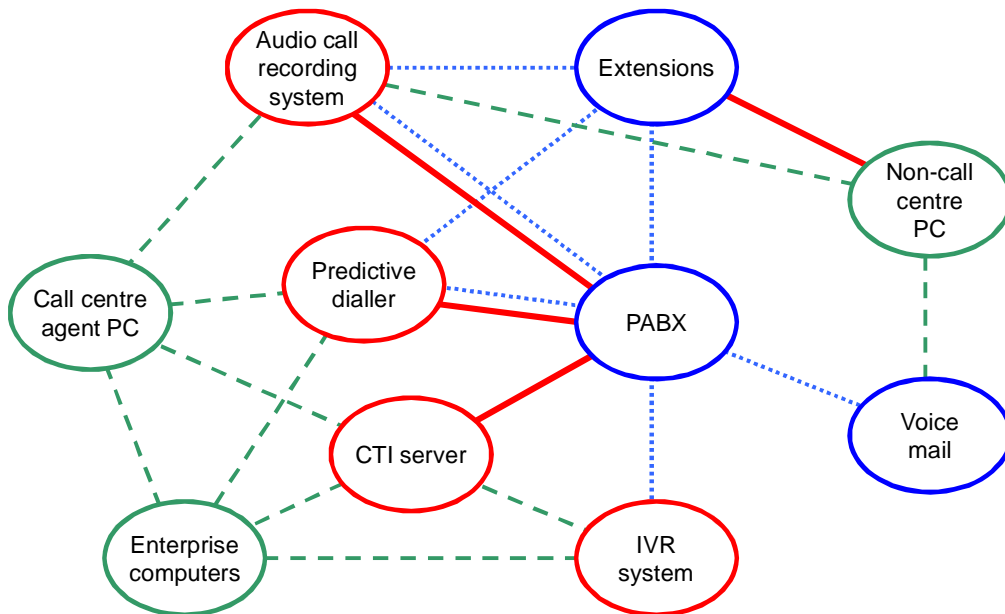


Figure 4 illustrates all of these links, a total of 21 all up. Of course most implementations of CTI will not include every functional element in the diagram,

nor will it require every one of the links illustrated. Nonetheless, an organisation 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 UnPABXs or 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 PABXs for over a decade. Of these, those that transmit voice *only* through on-premise local area network technologies are most precisely categorised as LAN-based telephone systems. Those based on PC or server hardware, whether or not they support voice over IP are most precisely categorised as PC-based telephone systems. Both are certainly preferable to the ambiguous terms of IP PABX and IP PBX which can also be applied to PABXs that support IP circuits, a capability most now have.

LAN-based telephone systems and PC-based telephone systems as product categories were analysed at length in the [Computer Telephony Integration: from the Internet to the Desktop](#) reports 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 PABX. 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 PABX 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 dialling 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 centre.

Following the publication of the [Computer Telephony Integration: from the Internet to the Desktop](#) reports 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 dialler 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.

3.4 PABXs

As with LAN-based and PC-based telephone systems, PABXs and hardware ACDs were analysed at length in the Computer Telephony Integration: from the Internet to the Desktop reports and that analysis will not be replicated here. Nonetheless, what is relevant to this update is that every one of the PABXs available in the Australasian 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 PABXs include a CTI interface as a standard offering, for others, it comes at a cost, not necessarily a trivial cost.

Although PABXs, as a product category, are mature products, the Computer Telephony Integration: from the Internet to the Desktop reports 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 PABXs' chassis.

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

4 CTI SOFTWARE

CTI software, as a product category, may be comprise 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 dialling 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

dialling, 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 centres. Non-call centre CTI software, not covered in this update, may offer voice mail, unified messaging and non-predictive dialling 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. In 2002, ACA Research found 18% of call centres had implemented a screen pop application. 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 the overwhelming majority of installations uses information gathered from the caller's interaction with the organisation's IVR. While IVR application design falls outside the scope of this report, the importance of having a well-designed IVR application cannot be overemphasised. 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 centre 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 realised. 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
Licence costs	moderate to high
Application development	negligible
Integration	negligible, integration with PABX 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
Licence 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
Licence 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
Licence 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
Licence 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 PABX 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, 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 Dialling

The third core capability of CTI software is screen/keyboard dialling. Even in call centres with predictive diallers, 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 dialling requires that the field or fields from which the number to be dialled 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 dialled 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 PABX 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 dialling can be implemented in either a limited-use basic manner or a more comprehensive and more useful manner. Basic screen pop utilises 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 dialling 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 dialling 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 organisation. As with so many other applications of CTI, the CTI application software must be specifically configured to fit the needs of the using organisation, 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 centre. 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. PABXs 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 PABX 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 centres instead use a combination of DNIS and IVR selections to route calls, albeit not always that comprehensively, with the better managed call centres 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 centres, the ability to have the CTI software monitor parameters in each call centre enabling incoming calls to be routed to the call centre 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 dialling, 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 dialling may require a server and dedicated PABX to CTI circuits just to provide call progress detection.

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

Table 1 – Optional Capabilities of CTI Software Products

Integral Capability	CTI products (worldwide) offering this capability in 1999	CTI products (in Australasia) offering this capability in 2003	CTI products (in Australasia) offering this capability in 2006
IVR	19 (38%)	14 (61%)	11 (69%)
Predictive dialling	18 (36%)	8 (35%)	6 (38%)
Audio call recording	9 (18%)	6 (26%)	6 (38%)
Collaborative browsing	14 (28%)	19 (83%)	12 (75%)
E-mail processing	3 (6%)	16 (70%)	13 (81%)
Off-switch ACD	16 (32%)	16 (70%)	12 (75%)

The CTI products available in the Australasian market in 2006 have, on aggregate, 63% of the optional capabilities that could be offered, a noticeable increase since 2003 and less than the 55% figure for the products in the European market and 49% for those available in North America but less than the 67% for those available in Asia. This suggests that only developers of more functioned products are inclined to have them distributed internationally and also that the Australasian market is not quite as mature as those of North America and Europe which are more accustomed to integrating separate products to offer these capabilities.

4.3 Off-switch ACD

The core of every call centre is an ACD which may be a software module supported by the PABX 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 PABXs 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 centres, a call centre 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 the [Computer Telephony Integration: from the Internet to the Desktop](#) reports and won't be repeated here.

Of the 16 CTI software products in the Australasian markets, 12 (75%) offer an off-switch ACD capability with the cost of this capability ranging from zero to over \$1,000 per agent. However, more than half of these products include the ACD module as a standard offering and for some of these, the developer claims that the CTI software's ACD module is used instead of that of the PABX at every one of their installations. Just how capable such ACD modules are is something potential buyers will have to determine themselves.

4.4 CTI Protocols

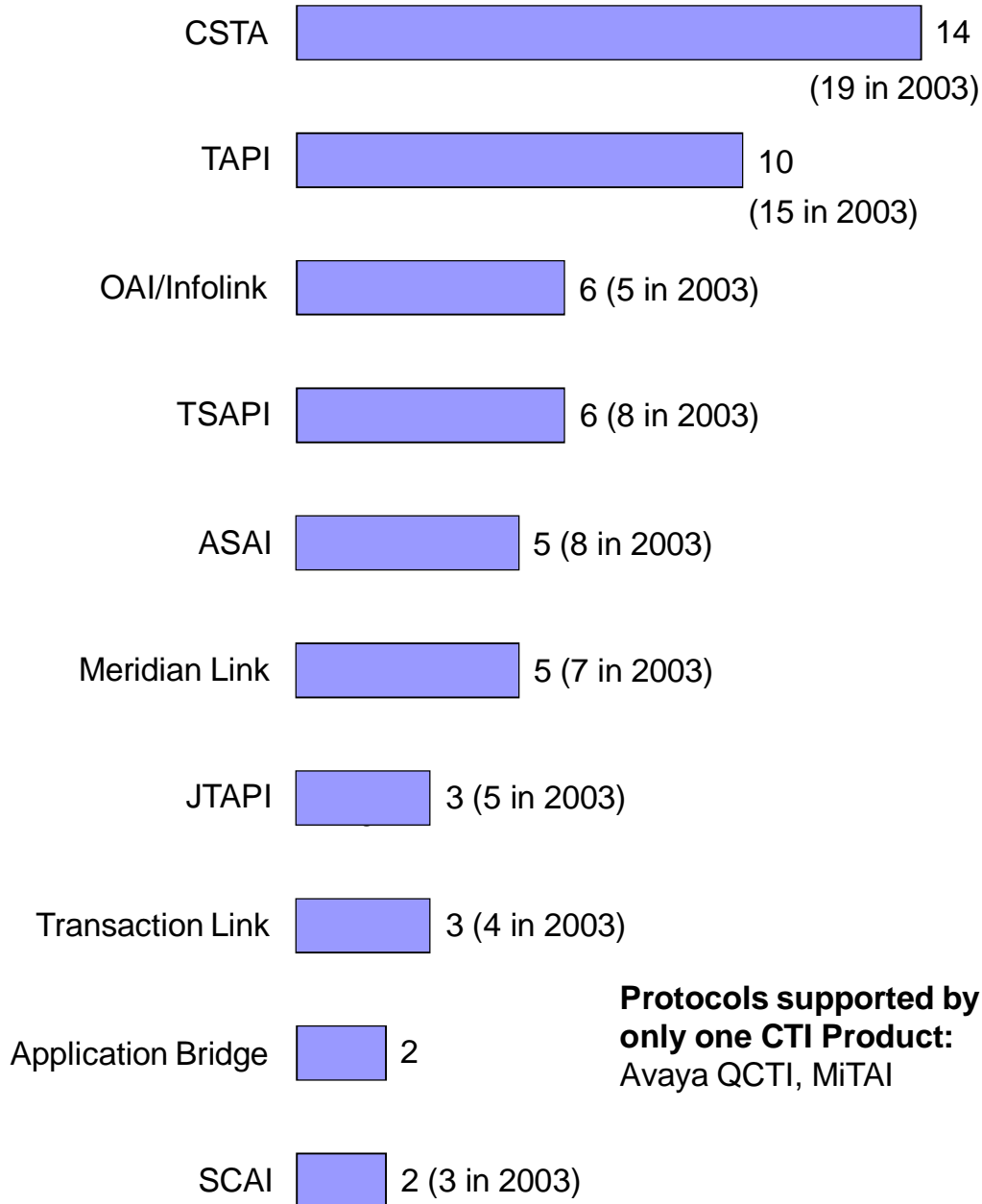
In 2003, there were a total of 21 CTI software products available in the Australasian market which supported one or more of 13 different CTI protocols. In 2006, there are 16 CTI software products available in the Australasian market which support one or more of 12 such protocols, with a slight change 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 14 of these products, down from 19;
- I The third-party version of Microsoft's TAPI protocol is supported by 10 products, down from 14;
- I TSAPI is supported by six products, down from eight;
- I Java-based JTAPI is supported by three products, down from four;
- I ANSI's SCAI protocol continues to be supported by two products;
- I Support for IBM's CallPath protocol has fallen from two products to zero;
- I The two most supported PABX vendor-specific protocols are Avaya's ASAI, supported by five products, down from eight, and Nortel's Meridian Link supported by five products, down from seven.

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 centre/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 (four products);
- 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 (IP FX and Zeacom);
- 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, Australian company Vocom's iQueue product and one Swedish 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 Australian company iTa, one company in the UAE and Sweden's Ericsson.

The Australasian market as a whole offers a reasonable choice of CTI software products with 16 products from 14 developers, although this is fewer products than in Europe (49), North America (36) and Asia (23).

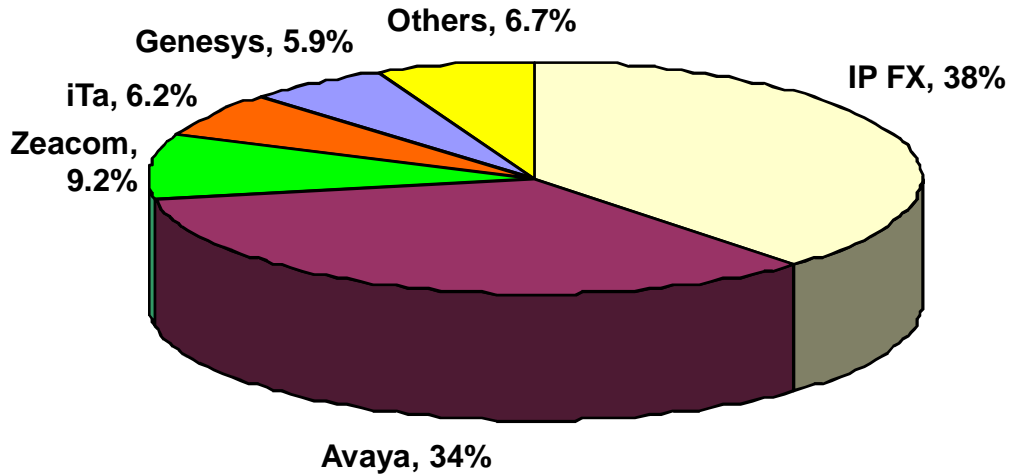
4.5.2 Operating Systems

In 2003, every CTI software product in the Australasian market supported Windows as the or a server operating system and this is unchanged. Three support Unix, a decrease from five and one supports Linux, the same as in 2003. Not surprisingly, all CTI products support Windows on the agent desktop. Four also support Unix, one supports Linux and two support Apple Macintosh on the desktop, similar to the tallies in 2003.

4.5.3 The Australasian Market, 2004-5 Sales

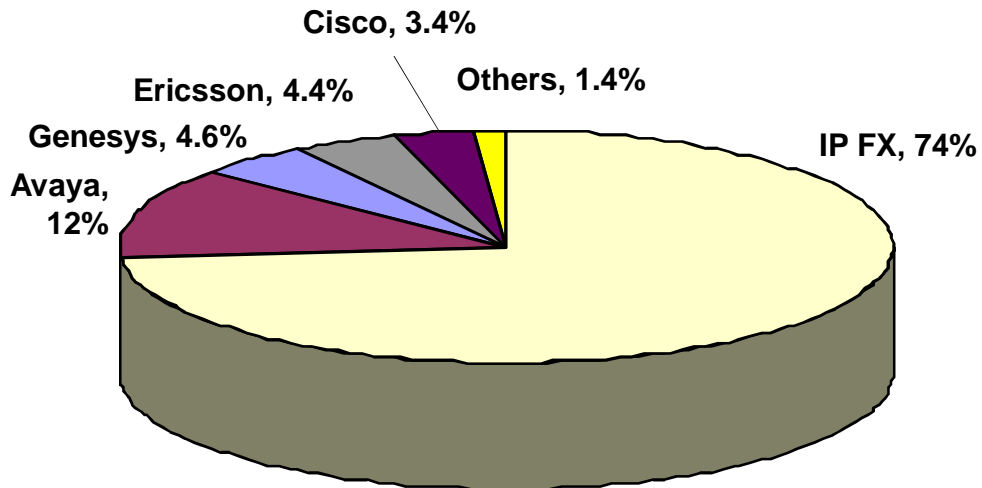
Bloor Research has measured CTI software sales in each of Australia and New Zealand by numbers of licences, independent of reseller and value of sales. IP FX had the largest share of CTI software sales in each country with Avaya coming second. Market sales shares for these markets are illustrated in the following pie charts.

Figure 6 - 2004-5 Australian CTI Sales



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

Figure 7 - 2004-5 New Zealand CTI Sales



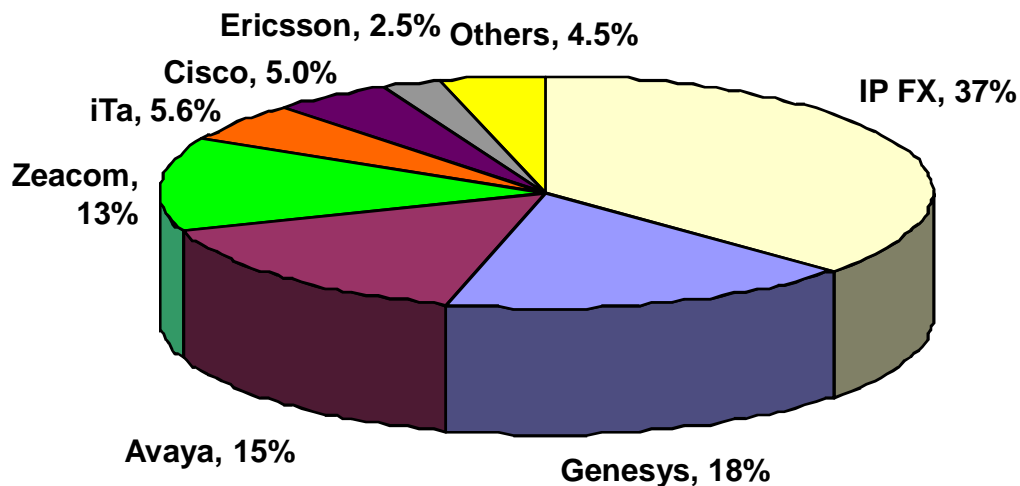
These market shares are of seats, by product, independent of reseller or systems integrator.

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

4.5.4 The Australasian Market, Installed Base

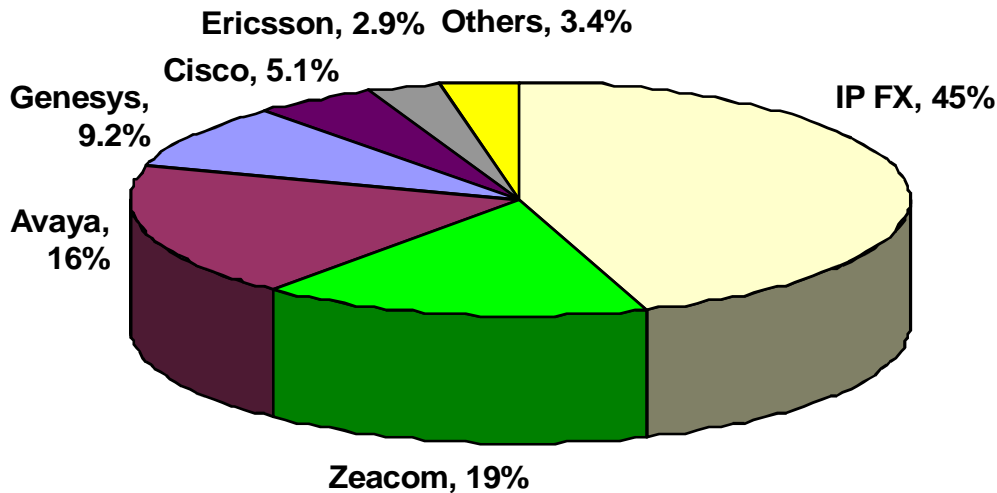
Bloor Research has also tabulated the installed base of CTI software products for these two markets and by this tabulation, IP FX has the largest share of both markets a significant improvement compared to 2003 when it held second place in both. Genesys had the second largest share in Australia and Zeacom in New Zealand.

Figure 8 - Australian CTI Installed Base Market Shares



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

Figure 9 - New Zealand CTI Installed Base Market Shares



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

Actual numbers of licences sold in 2004-5 and installed seats, or in a few cases, partial information enabling the numbers of licences and seats per market to be calculated were provided by Altitude, Aspect Software, Avaya, Cisco Systems, Easyrun, Ericsson, IP FX, iTa, Talking Computers, Telemangement and Zeacom. The remaining vendors with a presence in Australasia, 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 centres in Australia that have implemented a CTI application range from 18% 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 centres 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 centres 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 \$1,000 to close to \$10,000 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 Licence Fees for CTI Software

Per Agent Licence	Number of Products
less than \$250	1
\$250-499	3
\$500-999	4
\$1,000-1,499	2
\$1,500-1,999	2
\$2,000-2,499	4
more than \$2,500	1

It should also be noted that Envoy's CT-Connect product can be bought with a site licence allowing an unlimited number of users at that site. The average of list licence costs per agent is \$1,300, a significant decrease from the 2003 average of \$1,700. The average weighted by Australasian market share is \$880, an even more significant decrease from the 2003 weighted average of \$1,800.

Of course, licence fees only buy licences 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 licence fees with that of serious applications towards the upper end of this range. However, other vendors cited system development costs ranging from \$10,000 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 organisations have towards CTI.

It is very likely that when cost is cited as an 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 organisation that is considering implementing CTI would be well advised to estimate the

implementation costs and estimate the benefits. Not all call centres 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 centre/desktop CTI products also offer integral IVR, voice mail, predictive dialling, 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 11 of the 16 CTI products in the Australasian market offer an integral IVR capability and with most of these, this capability is available as an option. For an organisation 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. Six call centre/desktop CTI products also offer audio call recording.

11 call centre/desktop CTI products offer both e-mail processing and collaborative browsing as optional capabilities and another three 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 organisation 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

centre/desktop CTI product that offers one or both of these capabilities over buying one call centre/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 licences at the same time.

In this regard, predictive dialling has much in common with e-mail processing. Although they can be provided by separate systems, the system that provides the predictive dialling needs to be integrated with the telephone system. But there is no inherent advantage in buying a call centre/desktop CTI product that also offers predictive dialling, which six of the 16 call centre CTI products do, over separate products. Indeed, on some acquisition projects the author has undertaken for clients, predictive dialling 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 ACD. A total of 12 of the 16 CTI products (75%) available in Australasia 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, there can be no doubt that the high percentage in Australasia – higher than in North America – can be attributed, at least in part, to the market shares of some PABXs with mediocre ACD capabilities.

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

In summary, buying organisations must approach any acquisition process with a comprehensive specification of exactly what they require and, by implication, what they do not. Such organisations 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 PABXs 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 PABX may be expensive and may require a PABX 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 dialler;
- 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 PABX manufacturers, a lack of ready integration between CTI software and IVR systems, integration with older databases, complexity and PABXs 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 PABX and placed onto an external server;
- I PABXs are “proprietary” and PABX development is slow, inhibiting CTI deployment;
- I Telephone companies and PABX vendors have a vested interest in delaying the deployment of CTI;
- I Today’s technology forces users to buy PABXs, CTI hardware and CTI

- I server software from the same supplier;
- I Having the ACD function performed by the PABX 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 PABX 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 organisation'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 report included estimates of the penetration of CTI in call centres in Australia in 2002 ranging from 18% to 34%, with the calculated penetration, if all licences reported being sold were actually in use, of over 50%. Given the paucity of data and the lack of a consistent measures of what is actually being surveyed, this update report has not attempted to update such figures.

Nonetheless, two observations can be made. First as the 2004-5 sales were equivalent, using agent licence numbers, to about 34% of the installed base in Australia and 24% in New Zealand, CTI software sales are certainly buoyant. And although the call centre 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 licences. The installed base of CTI licences in Australia represents, based on the 2003 numbers of call centre agent positions reported in Computer Telephony Integration: from the Internet to the Desktop plus 5% growth, a CTI software penetration rate of about 120%! This is far higher than in North America and Asia and higher than in Europe. Clearly, many licences have been sold but are not being used.

6.2 Product Directions

6.2.1 Call Centre 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 10 - Product Landscape in 1999

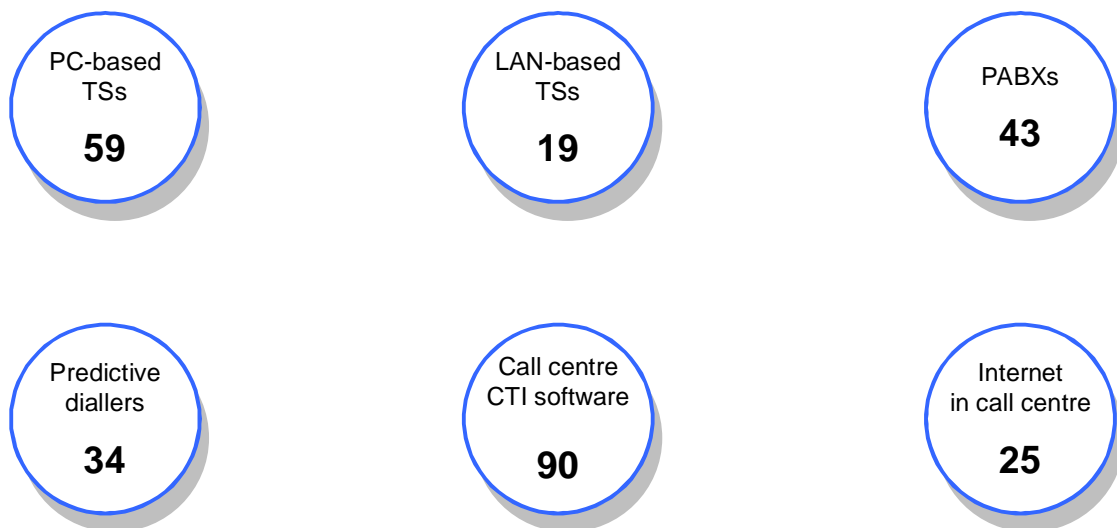


Figure 11 - Product Landscape in 2003

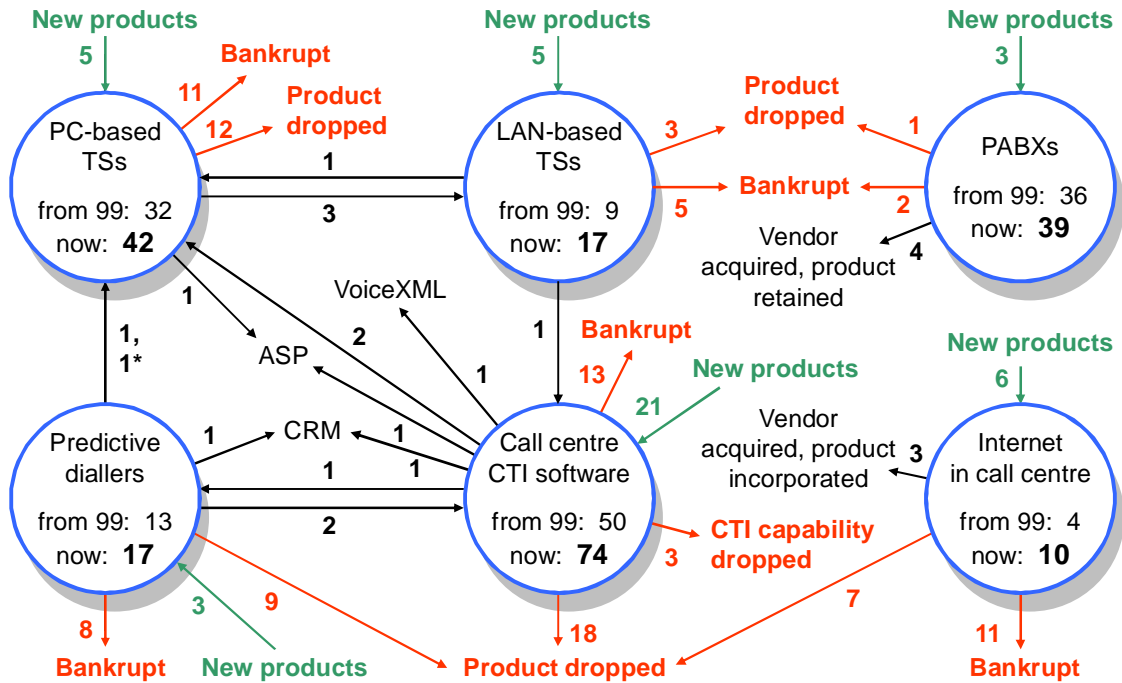
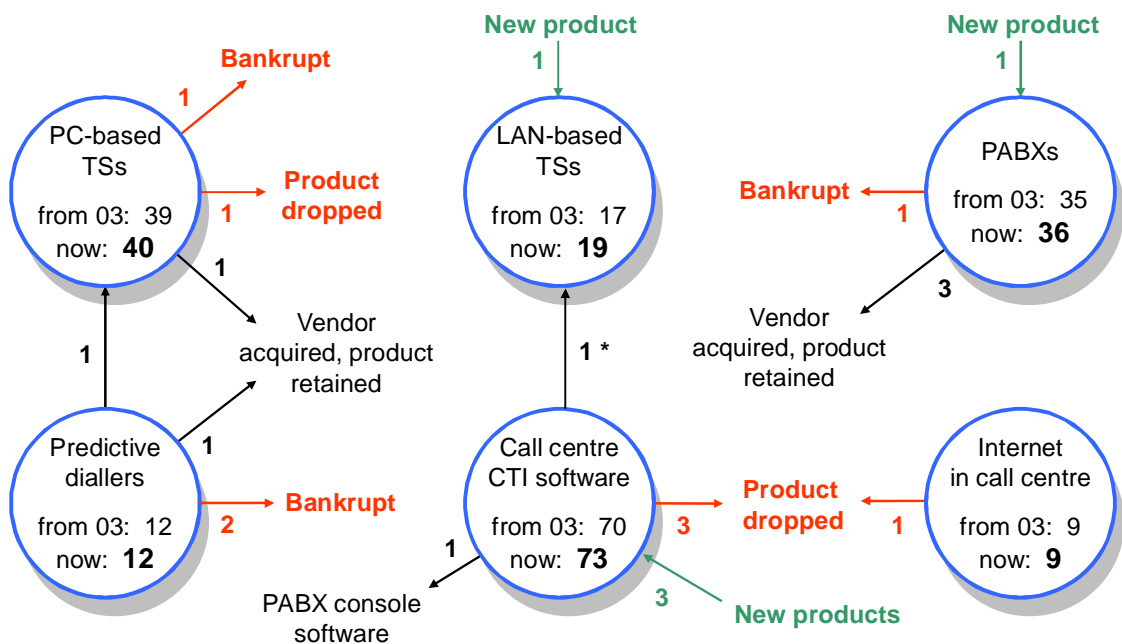


Figure 12 - Product Landscape in 2005



Explanatory Notes

Vendor acquired, product retained	The 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 PABXs, 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 Centre/Desktop CTI

Although things have quieted during the past two years compared to the period between 1999 and 2003 as illustrated in Figures 10-12, the field of call centre 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 customised implementation requiring professional services by those who know the CTI software product, and know it well.

Nonetheless, 73 products available worldwide and 16 in Australasia 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 PABXs is anything but standard with development of full integration to any one PABX a significant effort on the part of CTI software developers. The 73 call centre CTI software products have been interfaced to, on average, eight PABXs each. As long as there are a number of PABXs on the market, there will be a number of call centre CTI software products.

A second factor concerns the nature of call centre 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 centre 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 IP FX 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. And many products are distributed in only some geographic markets.

Nonetheless, while these factors inhibit consolidation, vendors cannot afford to be complacent. Products that support only a limited number of CTI protocols and PABXs are vulnerable to a falling from favour of those PABXs and/or those that support the protocols. Developers of CTI software need to keep abreast of the PABX 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 dialler 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 diallers, 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 PABX. 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 PABXs. 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 centres using PABXs with comprehensive ACD capability.
- 5 More applications for this technology will be developed outside of the call centre.
- 6 Vendors will also increasingly offer more flexible licensing arrangements to allow applications to cost effectively be deployed outside of the call centre.

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 organisation must deal. By

using a call centre/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 centre 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 organisations 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 centres 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 organisations, 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 organisation, 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 a term widely used in North America for CLI.

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 centres 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 dialler 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 PABX or hardware predictive dialler to track call progress by receiving network signalling and, if a PABX, pass it to the dialler.

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, which is more-widely used in Australasia.

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 PABX.

CLI Calling line identification (CLI) is the transmission of the number of the telephone service from where the call was initiated to the called telephone system.

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 centre agent speak while they view the same pages on that organisation'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 analysing 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 dialled 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 fulfilment 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 formalise defacto standards.

Enterprise Computing Applications Enterprise computing applications are computing applications typically residing on mainframe computers performing functions used by the organisation 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 Centre An ambiguous term implying a contact centre using a LAN-based telephone system with ACD capability, a PABX/ACD with IP circuits or one that supports only collaborative browsing.

IP PABX 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 PABX's own ACD instead of one provided by a CTI product is somehow closed.

PABX A private automatic branch exchange (PABX) is a telephone switch resident on a using organisation's premises with extensions and trunks. Such systems are referred to as PBXs (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 Dialling The process of generating outbound calls that involves the dialler waiting for an agent to complete a call before the next call attempt is initiated, but which presents only answered calls to agents.

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

Preview Dialling 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 organisations 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 Initialisation Protocol (SIP) is a standard for signalling 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, PABXs, 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 centre 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.

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

UnPBX See UnPABX.

Versit Versit is a now-dormant industry forum established to formalise 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 PABX A nonsensical term implying a PABX 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

<http://www.altitude.com>

Altitude Software is based in Lisbon, Portugal. Altitude's call centre CTI software is distributed exclusively in Australia by 3D Networks.

Apropos

<http://www.apropos.com>

Apropos is based in Oakbrook Terrace, Illinois, USA. Apropos's call centre CTI

software is distributed exclusively in Australia by KAZ Group.

Aspect Software

Aspect Software is based in Westford, Massachusetts, USA.

<http://www.aspect.com>

Level 15, 8 Napier Street, North Sydney, NSW 2060 Australia

Phone +61 2 8923 1300

Fax +61 2 8923 1333

E-mail info_anz@aspect.com

Product Contact Server

Classification Call centre CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialling, call routing and optional IVR, predictive dialling, 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), Meridian Link (proprietary to Nortel), Transaction Link (proprietary to Rockwell)

Product Uniphi

Classification Call centre CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialling, 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 Communication

<http://www.avaya.com>

Australian office

123 Epping Road, North Ryde, NSW
2113

Phone +61 2 9352 9000

Fax +61 2 9352 9111

enquiries@avaya.com

Product Avaya Computer Telephony (formerly Passageways)

Classification Call centre CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialling 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, TSAPI, JTAPI, ASAI (proprietary to Avaya), QCTI

New Zealand representative

Agile NZ Limited

<http://www.agile.co.nz>

10 Constellation Drive Mairangi Bay
Auckland

Phone +64 9 477 0550

Fax +64 9 477 0589

agile.info@agile.co.nz

(proprietary to Avaya)

Campbell Software Ltd

<http://www.campbell.co.nz>

Ground Floor, Westbrook House, 181 Willis Street, Wellington, New Zealand

Phone +64 4 802 7800

Fax +64 4 802 7809

E-mail sales@campbell.co.nz

Product CT-Connect from Envoy

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

CTI protocols supported

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

Cisco Systems Inc.

Australian office

<http://www.cisco.com>

Level 9, 80 Pacific Highway, North Sydney, NSW 2060

Phone +61 2 8446 6000

Fax +61 2 8446 8400

Product ICM

Email cs-rep@cisco.com

Classification Call centre 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 dialling, 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), Meridian Link (proprietary to Nortel) and Transaction Link (proprietary to Rockwell)

New Zealand office

<http://www.cisco.com>

Level 25 ASB Bank Centre 135 Albert Street, Auckland

Phone +64 9 355 1950

Fax +64 9 358 4442

Easyrun

<http://www.easyrun.com>

Easyrun is based in Raanana, Israel. Easyrun's call centre CTI software is distributed exclusively in Australia and New Zealand by Fujitsu.

Edify

Edify Corporation was acquired in 2005 by Intervoice.

Envox

<http://www.envox.com>

Envox is based in Stockholm, Sweden. Envov's call centre CTI software is distributed exclusively in Australia by Westan and in New Zealand by Campbell Software.

Telefon AB LM Ericsson

Australian office

<http://www.ericsson.com.au>

Level 37, 360 Elizabeth Street,
Melbourne, Victoria 3000

Phone +61 3 9301 1000

Fax +61 3 9301 3033

Product CCM

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

CTI protocols supported

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

Product Solidus

Classification Call centre CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialling and call routing, and optional IVR, collaborative browsing via callbacks, routing of e-mails to agents and off-switch ACD, specifically designed to work with the MD110 PABX.

CTI protocols supported

Third-party CSTA

New Zealand representative

Zintel Group

<http://www.zintel.co.nz>

PO Box 90373, AMSC, 5 Wilkins Street,
Freemans Bay, Auckland

Phone +64 9 360 7730

Fax +64 9 360 4238



Fujitsu

Australian office

<http://www.fujitsu.com.au>

Level 6, 1230 Nepean Highway,
Cheltenham, Victoria 3192

Phone +61 3 9265 0200

Fax +61 3 9265 0799

E-mail webmaster@fujitsu.com.au

Product EPICCenter from Easyrun

Classification Call centre CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialling, call routing, and optional IVR, progressive dialling, audio call recording, collaborative browsing using both voice through the Internet and callbacks, routing of e-mails to agents and off-switch ACD, able to interface with the ECI Coral and Nortel Meridian 1 PABXs and Cisco Call Manager LAN-based telephone system

CTI protocols supported

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

New Zealand office

<http://www.fujitsu.co.nz>

119 Featherston Street, Wellington

Phone +64 4 495 0700

Fax +64 4 495 0730

E-mail webmaster@fujitsu.co.nz



GENESYS®

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.

Intervoice

<http://www.intervoice.com>

Intervoice is based in Dallas, Texas, USA. Intervoice's call centre CTI software, acquired via their acquisition of Edify Corporation, is distributed exclusively in Australia by Premier Technologies.

IP FX

New Zealand office

<http://www.ipfx.com>

Level 13, Level 13, HSBC Building, 1
Queen Street, Auckland

Phone +64 9 357 3573

Fax +64 9 357 0083

E-mail sales@ipfx.com

Product IPFX

Classification Call centre CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialling, call routing and optional IVR, predictive dialling, individual audio call recording (on request only), routing of e-mails to agents, text chat and off-switch ACD, designed to work with NEC PABXs and Cisco's Call Manager LAN-based telephone system, respectively.

CTI protocols supported

Third-party TAPI v2.1, OAI (proprietary to NEC)

Australian office

<http://www.ipfx.com>

IPFX House, 63 Hume Street, Crows
Nest, NSW 2065

Phone +61 2 9779 3900

Fax +61 2 9779 3999

KAZ Group

<http://www.kaz-group.com>

Level 7, 66 Wentworth Avenue, Sydney NSW 2010 Australia

Phone +61 2 9844 0300

Fax +61 2 9844 0333

E-mail info_apropos@kaz-group.com

Product Apropos 5 from Apropos

Classification An IVR/CTI system that controls call queuing and performs screen pop, screen transfer with call transfer, screen/keyboard dialling, call routing, and optional power dialling, 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, TAPI v2.1

Premier Technologies

<http://www.premier.com.au>

Level 16, 501 Swanston Street, Melbourne Victoria 3000 Australia

Phone +61 3 9200 7777

Fax +61 3 9200 7788

E-mail sales@premier.com.au

Product Electronic Workforce from Edify

Classification Call centre CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialling, call routing, and optional IVR, audio call recording, 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 CallPath, TSAPI

Talking Computers Limited

<http://www.tcl.co.nz>

129 Onewa Road, PO Box 34 986, Birkenhead, Auckland, New Zealand

Phone +64 9 481 1100

Fax +64 9 481 1118

E-mail sales@tcl.co.nz

Product SuperQ

Classification Call centre CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialling and call routing with optional IVR, basic routing of e-mails to agents and off-switch ACD based on Dialogic's CT-Connect.

CTI protocols supported

Third-party CSTA

Tele-Management Associates

<http://www.teleman.com.au>

97 Brown Street, East Perth, WA 6004 Australia

Phone +61 8 9221 8000

Fax +61 8 9221 8001

E-mail sales@teleman.com.au

Product Tele-CTI

Classification Call centre CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialling, call routing, and optional power dialling, 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, TAPI v2.1, OAI (proprietary to NEC)

3D Networks

<http://www.3dnetworks.com>

593 Blackburn Road, Notting Hill Victoria 3168 Australia

Phone +61 3 9590 1000

Fax +61 3 9590 1111

E-mail 3dinfo@planetone-asia.com

Product uCI 2000 from Altitude

Classification Call centre CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialling, call routing and optional IVR, predictive dialling, 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, TSAPI

Westan

<http://www.westan.com.au>

Unit 1, 24 Skarratt Street, Silverwater NSW 2128 Australia

Phone +61 2 9648 2060

Fax +61 2 9648 2064

E-mail rwelland@westan.com.au

Product CT-Connect from Envoy

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

CTI protocols supported

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

Zeacom

New Zealand office

<http://www.zeacom.net>

5 Carlton Gore Road, Auckland

Phone +64 9 356 5555

Fax +64 9 356 5550

E-mail sales@zeacom.net

Product Q-Master

Classification Call centre CTI software that performs screen pop, screen transfer with call transfer, screen/keyboard dialling, 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 PABXs.

CTI protocols supported

Third-party CSTA, TAPI v2.1, TSAPI

Australian office

<http://www.zeacom.net>

Level 1, Unit 5, 26 Dunning Avenue
Rosebery, NSW 2018

Phone +61 2 8344 5555

Fax +61 2 8344 5550

8.1 Support for CTI

Readers will notice that there are a few vendors who purport to have CTI-capable products that are not included in the above table. Such absences have occurred either because the vendor in question has been repeatedly contacted by the author but not provided a response, information has been provided but the product does not, despite publicised suggestions to the contrary, support CTI or the vendor has kept such a low profile that they have not been identified by the author.

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. A product's support of CTI should not be taken as a reflection on 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.

9 STEPHEN COATES

Stephen Coates is the principal of Occidental Communications. 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 centres.

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 centre market appears on his Internet site, 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.