

F O C U S   S E R I E S



# **MANAGING TELEPHONY WITHIN THE SUPPORT CENTER**

**Eugene Ball, Ph.D.**



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WITHIN THE  
SUPPORT CENTER**

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## **Editor**

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# About the Author

Eugene Ball, Ph.D. is the founder and President of Help Desk Solutions, Inc., a customer service consulting company that focuses on assisting their clients improve processes, staff skills, and the use of technology to provide better service to their customers. Dr. Ball is a frequent speaker and writer for the customer service industry in which he has over 20 years of experience. Since founding Help Desk Solutions, Inc., Dr. Ball has assisted companies in size from start-up to Fortune 500, government agencies and institutions of higher education in the implementation or improvement of their customer service. He performs assessments of present operations, and provides recommendations and guidance to implementing and/or improving processes and procedures as well for new technology. Dr. Ball is a founding member of the Help Desk Institute's Individual Certification Standards Committee, a Help Desk Institute certified instructor, and a Help Desk Institute certified site auditor.

# Introduction

The increased demand by customers for technical support, while management continues to look for ways to reduce the cost of that support, has forced the customer support industry to look at ways to automate and measure all of the functions within the support center. One area that has made great strides is the communications (telephony) between the customer and the support center. For most companies some ten years ago, telephony meant the phone lines that connected the customers with the help desk analysts. These could be either internal or external customers. Today, telephony can be a lot more complicated than just a few lines connecting the customers and the analysts. The following chapters will look at the key components that make up the telephony technology used in today's customer service center.



# Terminology

Let's review a few definitions related to connecting a customer with the customer support center:

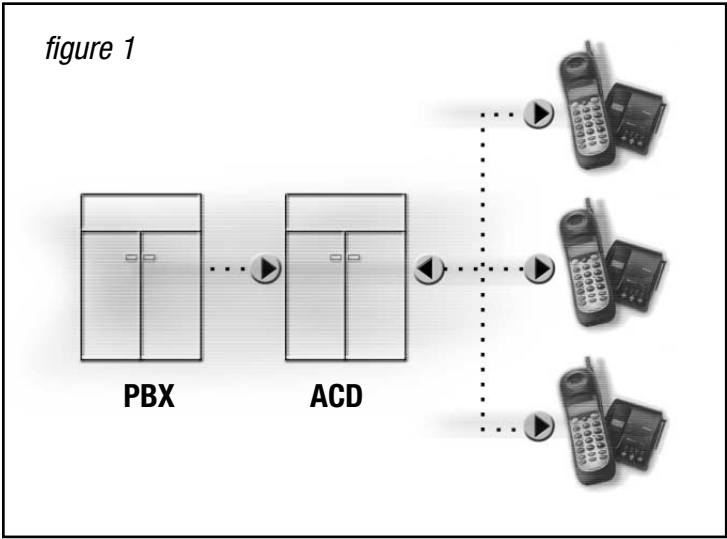
**Telephony** is the science of converting sound into electrical signals, transmitting it within cables or via radio, and reconverting it back into sound. Broadly, the term refers to the telephone industry in general. In the support industry, the term applies specifically to the telephone systems we use to connect our customers with our help desk.

**Private Branch Exchange (PBX)** is an in-house telephone switching system that interconnects telephone extensions to each other, as well as to the outside telephone network. PBX may include functions such as least-cost routing for outside calls, call forwarding, conference calling, and call accounting. Modern PBXs use all-digital methods for switching and may support both digital terminals and telephones, along with analog telephones. In some cases, the PBX is not owned by the corporate user, but rather by the local telephone company.

**Automatic Call Distributor (ACD)** is a computerized phone system that routes incoming telephone calls to the next available operator or agent. ACDs are the electronic heart of support centers, and are widely used by many departments of an organization. The ACD responds to a caller with a voice menu and connects the call to the appropriate individual.

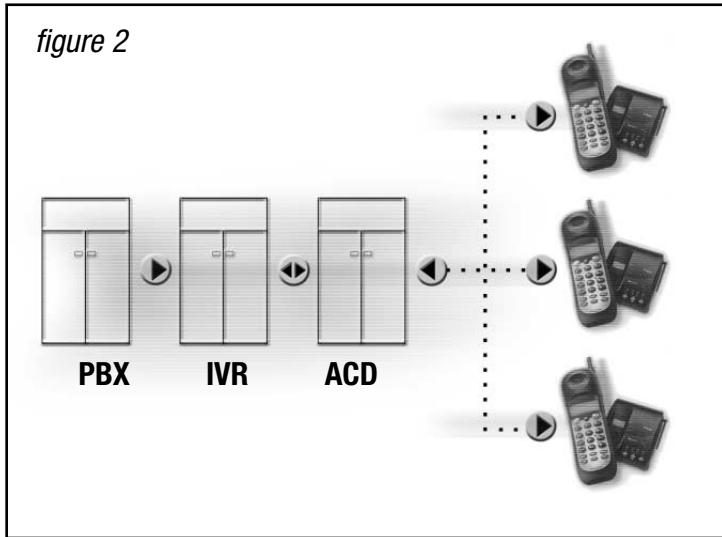
MANAGING TELEPHONY

Figure 1 shows a basic telephony configuration using ACD with a front end PBX system:



In this example, the ACD allows callers to make selections based on a tiered-voice menu, such as “Select 1 if your problem is a password reset. Select 2 if your problem is with e-mail,” etc. Based on the customers’ selections, the system routes them to the appropriate queues.

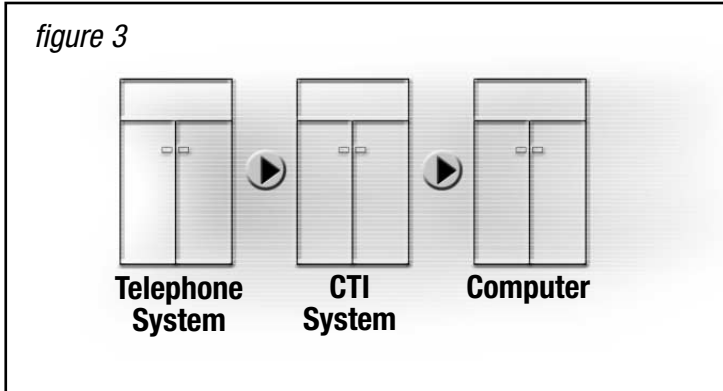
A front-end IVR telephony configuration is shown in Figure 2:



**Interactive Voice Response (IVR)** is an automated telephone answering system that responds with a voice menu and allows the user to make choices and enter information via the phone keypad or voice. IVR systems are widely used in support centers as a front end for ACDs to offload as many calls as possible from costly human analysts. The system may also integrate database access and fax response.

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Figure 3 shows how CTI might be configured in your telephony system.



**Computer-Telephone Integration (CTI)** technology combines data with voice systems in order to enhance telephone services. For inbound calls, one example of CTI is automatic number identification (ANI), which allows a caller's records to be retrieved from the database while the call is routed to the appropriate party. For outbound calls, automatic telephone dialing from an address list provides another example of CTI at work.

**Intelligent Computer Telephone Integration (ICTI)** applications can perform their functions based on rule-based capability that functions as a peer to the entire support center's operation and controls all underlying CTI applications.

# Chapter 1

## *Public Branch Exchange*

Switchboard operators like Lily Tomlin's character Ernestine are long gone when it comes to directing all calls in and out of the corporate office, but they won't soon be forgotten in telecom lore. Operators within offices, like the one portrayed by Tomlin, had to attach cables manually to complete circuits from the caller to the person being called. Today's PBX has replaced Ernestine.

The Private Branch Exchange (PBX) is the first step towards a complete telephony package. PBX is an in-house telephone switching system that interconnects telephone extensions to each other and often has several trunks to the local exchange carrier's central office to route calls to other locations. Features commonly supported on PBX telephones include:

- **Voice mail**
- **Call forwarding**
- **Conference calling**
- **Call holding**
- **Multi-lines on a phone set**

Least Cost Routing (LCR) systems determine the optimum telecom traffic routes based on calculations from billing data and such factors as time of day, destination of call, and quality or service call accounting

Modern PBXs use all-digital methods for switching and may support both digital terminals and telephones along with analog telephones.

# Chapter 2

## *Automatic Call Distribution*

Automatic Call Distribution (ACD) is the second piece a company adds to their telephony infrastructure. The ACD adds tools that can better both the customer and help desk management as they try to improve efficiencies and control costs.

The ACD function that best serves the customer is the creation of queues, although many customers may not agree. There can be more than one queue the customer can select using the touch pad on their phone set. In addition to multiple queues, the ACD can provide the customer:

- A reassurance message upon entering the queue and reassurance messages at programmable time intervals
- Hold music while in queue and no message is being played
- Configurable voice mail exit from each queue group
- Configurable time between each reassurance message (in seconds)
- Automatic repeat of last reassurance message

Once the customer is placed in a queue, the ACD provides the help desk with many tools that not only improve service to the customer but also manage the help desk. These tools include:

- Unlimited number of extensions in the ACD group
- Overlapping ACD groups

## AUTOMATIC CALL DISTRIBUTION

- Dynamic group adjustment on a call by call basis for ring, no answer group members
- Group pickup keypad function from any telephone
- Extension can login or logout of group
- ACD group extensions can be regular inside extensions or extensions that ring several phones at the same time (ring group extensions)
- Priority setting for overlapping queues
- Choice of round robin or least busy distribution strategies
- Reports to show both group and individual statistics such as:
  - Average time to answer (group)
  - Average hold time before hang-up (group)
  - Average hold time (group)
  - Length of longest hold time (group)
  - Average talk time (group and individual)
  - Average time available (time the individual was either talking or available to take calls)
  - Average after call time (both group and individual)

The ACD allows the help desk to structure itself so that the customer can get into a queue that will lead them to analysts with the more appropriate skills to resolve their problems. For example, a help desk could have one queue where the customer just wants to have their e-mail password reset and another queue for all other questions. Analysts that have the correct authority to change e-mail passwords would assist the customers in the password queue.

The many reports provided by the ACD enable help desk management to structure the staff so as to provide the best service for the customer as well as to use the available personnel effectively.

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Here is a good place to point out that not all ACDs are created equal. Many ACDs are constructed in modules. Consequently, you must be careful to develop your requirements based on your needs and review the offerings from each vendor very closely before you purchase.

# Chapter 3

## *Interactive Voice Response (IVR)*

Now let's look at how IVR technology can improve customer service and save employee time:

### **Enhanced Customer Input**

While the ACD by itself allows callers to make only single-digit selections using the telephone keypad, the IVR further enables callers to enter multi-digit numeric data using the telephone keypad. A new addition to the IVR is the ability to use speech recognition technology. Speech recognition has added functionality such as the ability to recognize a user ID that contains alpha characters. Speech recognition technology has made major advances in the last several years. The Gartner Group projects that within two years 30 percent of all IVR applications will have advanced speech recognition built in.

**A new addition to the IVR is the ability to use speech recognition technology.**

### **Increased Information Output**

The IVR can be used to provide just-in-time education without losing the caller's place in the queue. Short tips can be provided and the type of tips can be related to the type of queue each caller is in. If the customer's place is kept in the queue then the customer will be more inclined to

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listen and learn. The IVR can further manage queues by providing information about average wait time. For those callers experiencing long wait times, the IVR can offer alternatives. For example, an on-hold message can suggest to callers that they use the IVR to get technical assistance. The system can interact with callers to learn about their problems and recommend likely solutions from a database. The IVR can even be used in conjunction with a fax server to send requested information. The fax can be generated based on customers' responses to questions presented by the IVR.

### Improved Call Routing

Using the IVR system as a front end, it is possible to improve the ACDs call routing. For instance, an IVR system can prompt callers to enter incident numbers which signal the ACD to route callers to the specific analysts familiar with the particular products they're calling about. For groups that commonly work by telephone, a standard application can be written which, on request, calls everyone on a list and leaves a message with whomever answers

**For those callers  
experiencing long  
wait times, the  
IVR can offer  
alternatives.**

the phone (including the option to backup and replay for those who are scrambling to find a pencil.)

Network monitoring is a particularly useful application for these systems since, if your network has gone down, it doesn't help

to try and send e-mail to the person who is supposed to fix things!

## **Maximizing Your IVR Benefits**

The following are a few tips to keep in mind when selecting and implementing IVR applications:

### **Choose a System That Will Grow With You**

Look for a system that will add processor power, telephone lines, and voice storage capacity as needed.

### **Use Only High Quality Recordings**

While this often means professional recordings, this can be an added expense. Before you commit, check to see if there is extra cost every time you want the vendor to make changes to your scripts.

### **Make Sure Your System Runs Smoothly and Adapts Easily**

The sequence of your voice prompts should flow smoothly under all caller scenarios. Just as important, the program's content should be easily and quickly adaptable to your changing requirements. To meet these criteria, you may need to find a system integrator.

### **Check for Fax-Back as an Option**

Since people like to receive things on paper, make sure your vendor provides this option.

### **Look for an Open Solution**

Is the original equipment manufacturer an active participant in the ECTF (European Community Telework/Telematics Forum)? They should be. Advanced IVR is headed for the open CT (computer telephony) server; proprietary hardware systems will effectively lock you into very expensive upgrade paths.

### **Implement Speech Recognition in Your IVR**

Speech recognition is now a must. It makes your IVR system much more robust (the touchtone interface to input alpha characters has proven cumbersome).

### **Insist on Support for the Full Range of Communication Platforms**

More and more, customers want multiple ways to communicate with you. Unless you have a platform that can support multiple channels, each time you add a new way for customers to reach you, they'll have to start from scratch. Your platform should support not only touchtone and speech recognition, but also other service options including e-mail.

### **Purchase a System That Integrates Easily**

Your IVR must readily integrate with the technology currently implemented in your center. Ask the question, "Has your product been integrated with product X?" If the answer is "yes," make sure by checking references. If the answer is "no," you may want to look at other vendors.

### **Give Your Customers a Telephone-Accessible Database**

When your customers' call, they should be able to select from a menu and either: 1) add items to a database (e.g., place an order) or 2) check existing items in the database.

### **Provide Information Servers**

Your IVR should be able to play pre-recorded messages or fax back documents to the caller. Fax-back systems should not be limited to sending only pre-written documents.

### Cost Considerations

How much can this cost? The answer depends on what you need and what actions you want the IVR to perform. To give you an idea, we set up the following parameters and checked with some IVR vendors:

#### Parameters

400 – 500 calls per day (this is at the low end of call volume where IVR applications are normally used).

Customers can enter ticket numbers and the IVR will provide information about the tickets (this requires the IVR to have *text to speech* capabilities and be able to communicate with an SQL database).

Customers can enter their user IDs and specify what type of access they need, and the IVR will have the corresponding passwords reset (this requires the IVR to have speech recognition capabilities).

#### Further Factors

Given these parameters, the vendors calculated the number of ports required to handle this volume of calls. Part of this calculation was a guess about the two functions that the IVR would handle. The best guess was that each IVR-handled transaction would take about two minutes. Since the IVR application is to take calls away from live analysts, the number of ports should be adequate to handle a peak load of about twenty ports. These ports can be analog or digital, with digital ports adding additional cost.

#### Results

Based on the scenario given above, the cost of the application will be between \$75,000 and \$100,000,

## MANAGING TELEPHONY

if the IVR is brought in house. About one third of this cost will be for services of the integrator for the development, implementation, and testing of the application. It is possible to reduce the up-front cost by outsourcing the IVR. This option uses the ASP (application service provider) model where the vendor develops the application and maintains the application on its equipment in its facility. This option can reduce the up-front charge to a \$15,000 start-up fee and a yearly fee of \$3,000 for a three-year contract.

Even though the cost can be high, the return on investment can make it well worth your consideration.

# Chapter 4

## *Computer Telephony Integration (CTI)*

CTI is another tool that many customer service centers have implemented to improve customer call handling. CTI is the merging of computer and telephony hardware and software technologies to provide high-tech, user-friendly services. A simplistic explanation is that a CTI system takes information from the telephone system, be it PBX, ACD and/or IVR systems, and uses that information to interact with other computers.

A common CTI implementation is the screen-pop. When a customer calls the customer service center, the telephone system delivers the (ANI) Automatic Number Identification or caller's telephone number to the CTI system. The CTI system displays the ANI plus information about the caller on the designated analyst's computer screen. The additional data is retrieved via the CTI system from an in-house database as the caller and the analyst are connected. Most customers like the personal touch of being addressed by name and having other information already available when their call

**Most customers  
like the personal  
touch of being  
addressed by  
name .**

is placed. Therefore, all sorts of businesses, e.g., pizza delivery establishments, catalog sales, and help desks, have deployed this type of CTI application.

One problem with the above CTI application example is the phone number delivered to the recipient may not be helpful. For example, all phone calls coming from another company's PBX could have the same ANI or the customer may be calling from a phone that is not connected with the customer information in the database. In such cases, the correct customer data would not be delivered to the analyst. If these or similar examples happen often, it would be useful to place an IVR between the PBX and CTI to gather more information from the caller, such as the caller's personal ID (PID) number.

### **Several CTI Application Examples**

It is important to remember that CTI applications are not off-the-shelf. With that in mind, the only major restrictions to CTI applications are money, time and imagination.

1. Based on the caller's telephone number, the CTI application can be integrated with an RMS (Request Management System) to deliver a screen-pop to an analyst who will assist the customer. This assumes that the RMS database contains information about the caller and the information can be retrieved based on the telephone number. The CTI application takes the phone number from the ACD and retrieves information from the RMS database. In addition, the CTI application can receive information from the ACD that identifies the analyst that will assist the customer. In most cases, the analyst's screen fills with information about the customer as the analyst and the customer are connected.

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A variation of the screen-pop is the use of an IVR to gather more information from the customer, such as the customer's ID number. With the customer's ID number, the system can provide better results when retrieving data from the RMS database.

2. Using the ACD and IVR to gather information from the customer, it is possible to automate many time-consuming tasks, such as status information about an open problem. In this implementation, the ACD moves the customer to a queue for open problem status. The IVR prompts the customer for the open problem (RMS) number (here voice-to-text technology can be used). The IVR passes this information to the CTI application, which retrieves predetermined information from the RMS ticket, such as the ticket status, date and time of the last update, and the text of the last update. Now the CTI application passes the retrieved data back to the IVR. The IVR, using text-to-voice technology, reads the information to the customer.
3. Another task that can be automated is password resets. Again the ACD moves the customer to a queue for password resets. The IVR prompts the customer for the necessary information, such as Customer ID or Name, for which the password is needed, and a PID. The IVR passes the information to the CTI application. The CTI application then communicates with software that can reset the password. That software can also send the new password back to the IVR through the CTI application and the IVR in turn could read the new password to the customer.

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However, security concerns may require the IVR to call the customer to provide the password (text-to-voice technology) or may require the CTI application to e-mail the password to the customer.

4. A CTI application can be integrated with a workforce management system to provide the customer with the best-qualified person to assist with the request. In this case, the ACD and the IVR are used to identify both the customer and the type of problem he or she is experiencing. This information is passed to the CTI application. Now the CTI interacts with the workforce management application. The workforce management application identifies a list of analysts that are best qualified to meet the customer's request and are available to receive the customer's call. Using the information from the workforce management system, the CTI application communicates with the ACD to get the analyst and the customer connected. The ACD maintains information about which analyst on the workforce management list is available at that moment. If the support center is a virtual center, the CTI application may be communicating with more than one ACD to find the right analyst, in which case the workforce management application would provide the physical locations of the analysts.

# Chapter 5

## *Intelligent Computer Telephony Integration (ICTI)*

Most CTI applications are limited in that they can automate only specific tasks on a host computer, network, dialer, IVR, PBX and ACD. Each component of a CTI application is configured as a peer and performs a specific and predefined function.

More advanced CTI or ICTI applications can perform their functions based on rule-based capability that functions as a peer to the entire support center's operation and controls all underlying CTI applications. This rule-based capability enables enterprises to proactively and dynamically program their entire operation so that it reflects management's goals and objectives.

ICTI applications have been shown to reduce an analyst's talk time, telephone line time, hold time, identification time, and transaction time. In addition, ICTI applications can provide supervisors and managers with tools that supply a real-time link between overall strategic objectives and daily operations. These more advanced applications are based on the following capabilities:

- Operational rules established by management
- Real-time decision-making based on those rules
- Flexibility to add, delete or modify rules incrementally
- Communication over different CTI links to integrate and control different systems or system functions
- Call routing to appropriate analysts based on internal guidelines and external conditions

**How Can You Decide if a CTI Application is Cost Effective?**

First, decide on the tasks that the CTI application will accomplish for your operation. This is very important since CTI implementation is a costly undertaking. Suppose the goal is to reduce the number of analysts and maintain the same customer satisfaction. Let's look at one of the more common applications, namely the screen-pops, and let's make the decision based on the following four assumptions:

Assumption 1	Each successful screen-pop will save the analysts 30 seconds.
Assumption 2	The hardware, software development, and testing of the application will cost \$50,000.
Assumption 3	The average salary of the analysts is \$17.50 per hour
Assumption 4	Each analyst answers 45 calls per day.

Based on the above assumptions, it will take 41,667 successful screen-pops just to pay for the application.

$$\text{Number of calls to break even} = (\text{Application Cost}) / ((\text{Analysts cost per hour}) / 60 / 2)$$

Number of successful screen-pops required to save the equivalent of a man-year's time = (2000 \* 60 \* 2) or 240,000

The support center meeting these assumptions above must receive 240,000 calls per year using the CTI application to justify a reduction of one analyst. These are the hard dollar and cents reasons, but a support center would gain goodwill

from the customer with the better service provided by the CTI application.

Screen-pops alone may not justify the implementation of a CTI system, but by adding other functionality such as password resets and status information calls, the CTI application may be cost effective.

### **Steps Required to Implement CTI**

After making the decision to go forward with a CTI implementation, the present systems must be evaluated. The following questions are crucial:

- Will the present telephony equipment such as PBX, ACD, and IVR support CTI integration (both hardware and software?)
- Is it possible to integrate these systems with third party vendor equipment?
- Do the other non-telephony systems that will be part of this implementation support the API (Application Programming Interface?)

Next, you need to find a telephony integrator. It is extremely important that the CTI applications integrate with the technology currently implemented in the support center. Ask the CTI vendor such questions as “Has your product been integrated with product X?” If the answer is “yes,” make sure by checking references. If the answer is “no,” you may want to look at other vendors.

Here are a few questions to consider about the CTI application and integrator:

- Is the application easy to install, operate and manage?
- Is there single view, integrated systems management?

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- Will an increasing number of ports decrease system performance?
- What will be the overall cost of ownership?
- Is the architecture based on open standards?
- Are there any proprietary features or functions?
- Does the vendor offer a choice of support services?
- Will those support services be able to address the overall architecture or a subset of components?
- Is the system scalable?

In addition, make sure that your CTI application has the ability to grow with your business needs and with some of the technologies that are emerging, such as integration of fax back, voice mail, and Web interface.

### **CTI Testing**

When the vendor has the CTI application and all other tools ready, don't forget to test. Many experts suggest the application undergo four types of testing:

**Conformance Testing** – Call generators put the entire network through its paces by simulating actual user calls, including all possible interactions with the CTI application.

**Load Testing** – Using the parameters in the conformance test, the system is then tested to verify how it will perform under varying load conditions, which will include a large number of calls of short duration, and long and complex call interactions.

**Regression Testing** – In regression testing, call generators again are used to create a nominal amount of highly variable and complex traffic to simulate every possible path and decision a user could make. This test is run initially with the previous version of the

## INTELLIGENT COMPUTER TELEPHONY INTEGRATION (ICTI)

product and then run again with the new release to ensure that the new release will yield predictable results in all scenarios. If this is a new implementation, then this test will be useful when upgrading the application, the hardware, or any of the other pieces in the integration.

**Acceptance Testing** – Acceptance tests address the specific performance requirements checklist agreed to by the vendor and purchaser, and stipulates exactly how the product should perform in the purchaser's specific environment. It is the responsibility of the purchaser to provide the vendor with this checklist, so the vendor can prove that the application meets all requirements.

# Chapter 6

## *Hardware and Software Considerations*

Just a few years ago each of the applications—PBX, ACD, IVR and CTI—were systems that required their own hardware and software. Today, as the computing power of the server/PC is increasing and the price of these powerful servers has come down, more vendors have been able to offer one or more of the specialized applications as a package that can run almost any hardware and operation system combination. However, this ability comes with two edges: the tools have been brought into reach for more companies, but these multi-functioning telephony servers and applications also bring some problems. The single application server has demonstrated strong reliability. The single application server can expect good reliability because the vendor has selected components that work well together and are compatible with their applications. Also, when a server supports only the operating system and a single telephony application, reliability is much more straightforward.

It does not take much to guess that a new level of difficulty is added when we incorporate factors such as unknown hardware and more than one application, each competing for resources while trying to communicate with each other. When problems arise in the multi-application environment on a single server, finding both the cause of the problem and the solution can be costly and time consuming. There is nothing so helpless as a customer service center without any incoming communication.

## HARDWARE AND SOFTWARE CONSIDERATIONS

No matter which configuration you decide to implement, research of your telephony vendor should include all of the important steps for implementing new technology:

- Define your needs (don't forget a business case)
- Define the customer's need
- Define your procedures (present and future)
- Find the vendors (check their business background)
- Develop your present and future requirements
- Find the vendors that can meet your requirements
- Check with the vendors' customers
- Put up a pilot
- Test, test, test

Telephony applications have the potential to improve your customer service while reducing the cost, but only through careful evaluation can you turn the potential into reality.

# Telephony Resources

Telephony resources can be found by searching the Web using common search engines. Several Web sites that provide vendor information and/or easy search capability include:

[www.thinkhdi.com](http://www.thinkhdi.com)  
[www.networkcomputing.com](http://www.networkcomputing.com)  
[www.callcentermagazine.com](http://www.callcentermagazine.com)  
[www.supportindustry.com](http://www.supportindustry.com)  
[www.realmarket.com](http://www.realmarket.com)  
[www.yahoo.com](http://www.yahoo.com)  
[www.serviceware.com](http://www.serviceware.com)

Some Web sites offer a buyer's guide where product and vendor information can also be researched.



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