Telecommunications in the Hospitality Industry

Developed by
The American Hotel & Lodging Association’s
Technology Committee
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INTRODUCTION

Telecommunications has always been a bit of a “gray area” for most hospitality environments. Individuals in management traditionally have relied on their telecommunications vendors to advise them on the management of their systems. In addition, they also have relied on large markups from guest phone calls to provide healthy revenue streams that not only offset the costs of providing the communications service but also added significant revenues to the bottom line. However, with phone technology changing faster than ever, guests are no longer reliant on the property’s telecommunication system to provide them with communications to the “outside” world. The introduction of cell phones has allowed guests tremendous flexibility with regard to staying connected from both a business and a personal standpoint and has made them less reliant on the hotel for these services. In addition, hotels have had to make significant capital investments to stay current with technology.

With the introduction of the Internet and the move from analog to digital-based systems, the hospitality industry has had to invest more money with less of a return on its investment. Whereas telecommunications used to provide healthy revenues for a hotel, it has now become imperative for hotels to manage their communications effectively to realize profits in this department. As such, this document is intended to provide some clarification to help managers manage their telecommunication departments effectively.

Traditionally, telecommunications in the hospitality environment has been composed of three major components:

- Private branch exchange or switch
- Voice mail
- Call accounting

Although these systems usually have operated independently of one another, there is clearly a focus to unify all three applications. That being said, let’s examine the systems individually and identify their basic functionality and some of the new features that are being offered by the various manufacturers.
SWITCHES/PBX SYSTEMS

A private branch exchange (PBX) is a telephone system within a hotel that switches calls between the hotel users (including guests) on local lines while allowing all users to share a certain number of external lines. PBXs were introduced into hotels to address the need for guestrooms to have their own private extensions, with a centralized operator to process the calls for those extensions and to provide guest services. Providing individual lines to the guestrooms was cost-prohibitive and did not satisfy the guest service requirements needed to operate a hotel effectively.

Switch Components

A traditional telecommunications switch is usually made up of the following components:

Central Processing Unit

A PBX is basically a computer that processes calls and information. As such, the core of the switch is composed of the typical components found in a computer, namely—

- Central processing unit (CPU)
- Motherboard
- Memory
- Hard drive(s)
- Power supply

Station Line Cards

Each phone or connection point that is attached to the switch is known as a “station.” To provide connectivity to each station, the PBX is equipped with station cards that link each individual port to the switch. These cards provide functions such as ringing, holding and turning the message-waiting light on and off, among others.

Station cards are designed to accommodate multiple ports on each card. Usually the cards are provisioned to carry port counts in multiples of eight, and they typically contain a count of 8, 16 or 24 ports. The cards are integrated with the switch to allow the switch to handle multiple ports and calls at any one time. There are two types:
Digital station cards – these convert an analog transmission (such as the human voice) into a digital signal, which is easier to manage and can be cleaned up to provide a higher-quality signal than an analog transmission. Digital cards allow for increased performance and enhanced features, but they require digital phones and are usually proprietary to a particular switch. Typically, digital phones are used for administrative purposes within the hotel. Digital station cards also are used for digital voice-mail systems.

Analog station cards – these are required for the more traditional analog signals created by standard phones, faxes and modems. Analog phones usually are not proprietary and do not carry many of the call routing/management features found in digital phones. Analog extensions typically are used for guestrooms, house phones, fax lines and modem lines. Analog station ports also are used in conjunction with analog voice-mail systems.

Trunk Cards
Trunk cards typically are used to facilitate the use of plain old telephone service (POTS) lines within the switch. In smaller hotels, they are used for the main inbound and outbound communications. In larger hotels that can support primary rate interface (PRI) or T1 (“Tee-One”) circuits (see the Appendix), trunk cards very often are used as backup lines in case the PRIs or T1s fail. Trunk cards typically can support trunk lines in multiples of eight. These cards are designed to attach individual trunks from the phone company to the PBX. Even if the hotel utilizes T1 circuits to provide its inbound and outbound phone traffic, it is always a good practice to attach individual phone lines as a backup in case the T1 circuits go down.

Direct inward dial (DID) concept – DID allows one circuit to handle inbound calls for multiple extensions while allowing callers to bypass the telephone operator and connect directly to an individual extension. DIDs also allow hotels to have numerous fax numbers running on just one phone line. Many hotels keep a pool of available DID numbers to assign to the second line on a two-line guestroom phone if a guest requests a direct-access extension. The main benefit of using the DID technique is the reduction in equipment and administrative costs while providing improved guest satisfaction.
PRI Cards

PRI cards are digital links between the PBX switch and the telecommunication provider's central office. PRIs contain a digital circuit that requires both ends of the circuit to be provisioned to accept and receive information on automatic number identification, DIDs and other transmission-identifying information. PRIs are provisioned to provide both inbound and outbound communication service to the PBX.

T1 Cards

Like the PRI card, the T1 card links the switch to the telecommunication provider’s central office. T1 circuits can provide both inbound and outbound traffic, but because they do not have a digital circuit, they cannot provide inbound Digital Number Identification Service (DNIS) information. In the United States, T1s usually are provided with 24 voice-grade channels. If a hotel requires a lot of phone lines, it often is cheaper to install a T1 than to operate on individual lines.

Figure 1: ADTRAN T1 channel service unit

A channel service unit (CSU) converts digital data from the communications protocol used on a local area network (LAN) into that used by a wide area network (WAN), and vice versa. In essence, this is required to connect the T1 or PRI from the telecommunication provider’s central office to the PBX.

Hospitality Features and Functionality

What differentiates a hospitality PBX from that of a conventional office or business PBX? Some of the key features are as follows:

Enhanced attendant backup – this allows for multiple attendants to be able to answer incoming calls.

Answer detection – this is the ability to determine if a call made by a guest was actually answered. This is especially important in assessing charges for calls made by guests, but it’s also useful for tracking administrative calls.
Crisis alerting – hotels have a responsibility to provide necessary assistance in an emergency. Most telecommunications systems can notify and alert various departments such as the front desk and security as soon as an emergency 911 call has been placed and identify the specific extension making the call.

Call center – features such as automatic calling number identification and integration with automatic call distributors are especially useful in maximizing the effectiveness of reservations departments.

Property Management System Interface Features
In addition, hospitality-centric systems contain property management system (PMS) interface features that provide the following capabilities:

- Allow guestroom telephone access to outside lines after check-in and restrict access upon check-out
- Display guest information, specifically name and room number
- Generate reports on guestroom telephone activity
- Check and report on the status of a room from a housekeeping standpoint
- Program or allow guest wake-up calls
- Block calls between rooms and restrict internal/external calling by room
- Provide DID number pooling — allocating lines from a reserved set of direct phone numbers as needed for guestrooms, thereby allowing for private direct lines for the guests.

Some guest-centric PBXs also provide the following functionality:

Do-not-disturb forwarding – allows guests to receive voice-mail messages when the do-not-disturb feature is activated, thereby eliminating a busy signal to the caller.

Language and VIP indicators – allows the hotel staff to answer incoming guests’ requests in an appropriate manner and/or language. Multiple language and VIP wake-up calls allow for customized wake-up calls to certain guests and the ability to provide them in multiple languages.

PRI calling name – enables guests to view the name and phone number of the caller, in addition to the date and time that the call was placed. Up until now, this was not feasible because the phones in the rooms were analog and the PRI required a digital interface to display the information.
Caller ID auto number ID block – enables the guest to prevent his or her caller ID from being displayed.

Clear call block at check-out – clears any blocks that were set on the room phone upon the guest’s checkout. For example, if guests block calls from another room in the hotel and block outside callers, those features would be reset upon their check-out.

Daily wake-up registration – allows the attendant to set the same wake-up call time in advance for the duration of the guest’s stay. (The setting applies to both the first and second wake-up calls.)

System Redundancy

Because PBXs fulfill an important role when it comes to emergency services, it has become imperative that the system “uptime” be kept to a maximum. If a guest has an emergency, the ability to dial 911 and request assistance is critical. As such, hotel companies are now placing a greater emphasis on system uptime and, therefore, the redundancy in PBX systems.

The redundancy includes, but is not limited to, the following:

• Power supplies
• Hard drives
• Motherboards
• CPUs
• Station cards
• Full memory
• Control units

In addition, greater emphasis has been placed on maintenance support and response time. It is not uncommon for companies to provide two-to-four-hour on-site response times to meet the uptime objective. In many cases, the systems are monitored “online” and issue alarms to the maintenance companies prior to the failures even occurring. Although there is obviously a cost associated with this additional redundancy, many owners are willing to pay for the added “peace of mind.” In general, it is recommended that all PBX systems be equipped with full redundancy to ensure maximum communications uptime.
Phones

Ask most personnel and guests about the communication system within a hotel, and all they care about is what the phone looks like and how to operate it. In this respect, there are usually two types of phones prevalent within the hotel — digital and analog.

Digital Phones

Digital phones are able to interact with the phone switch and are feature-rich. They offer such features as the following:

- Digital displays (on some models)
- Conferencing
- Phantom extensions
- Multiple lines
- Programmable function keys
- Message waiting
Analog Phones

Analog phones are the more typical guestroom units, as they are a less expensive solution than digital models. In addition, the guest phones do not require the same features as administrative extensions. Further, some configurations such as cordless phones can prove to be problematic in large installations. Features found in analog phones include the following:

- Message-waiting lights
- Data ports
- Speed-dial buttons
- Optional display
- Cordless handsets
- Speakerphones

Although most guestroom phones found in hotels tend to be two-line phones, house phones are typically single line.

IP-Based Phones

A new addition to the hospitality industry is the Internet protocol (IP) based phone. IP telephony enables phones to be connected directly to the hotel network (LAN), replacing or transforming a hotel’s existing phone system by allowing data and voice networks to be converged without losing features or functions on either network. (IP-based phone systems are discussed in greater detail later on in this document.)
Music on Hold

Most people dislike waiting, but research shows that letting callers hear music when on hold does keep them in a better frame of mind. Alternatively, hotels can play messages to promote their property and special features. Most phone systems have the capability to provide music on hold as part of their basic functionality, and many can play multiple feeds for different types of calls. Research has shown that—

• A high percentage of callers prefer music or announcements to silence.
• Whereas almost all callers with silence on the line will hang up in less than a minute, callers with music will stay on the line for a longer period of time.
• Callers with music on hold actually perceive the time spent on hold as shorter than callers who hear only silence.
CALL ACCOUNTING

Providing telephone service is much more than just another way of catering to your guests; it is also an important revenue source. Call accounting systems (CASs) enable hotels to resell telecommunication services to guestrooms, meeting rooms, event spaces and other common guest areas. These systems enable hoteliers to independently capture and analyze guest telephone activity and then independently control profit margins and pricing methods for that activity. Recently, especially with the lower usage from guestrooms as more guests carry cell phones, the reporting aspects of these systems have become very sophisticated.

Hospitality Features and Functionality

Among other important features, call accounting systems allow hotels to—

• Bill guests, clients or projects for calls made on their behalf. These calls may be selectively billed by call types as well as specified thresholds and durations.
• Interface to the PMS for immediate charging capabilities.
• Resell telephone services.
• Track calls made in emergency situations.
• Print detailed statements to assist with the guest check-out process.
• Provide point-of-sale features (in some cases billable) for additional guest services, such as voice mail, facsimile, gift shop purchases and guest/special meals. This can be particularly useful in business centers where charges often are made for “dial-up” and faxing services.
• Provide polling and pricing call detail records in real time.
• Generate a variety of management reports on resale, charge-backs and system administration items.
• Allow multiple users to access the system from the computer network.
• Generate up-to-the-minute real-time reports.

Internal vs. External Call Accounting Systems

Two types of CAS are typically available: those that are built into the PBX and those that are external to it.
Some of the advantages of the "intra-PBX" built-in systems are as follows:

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<th>ITEM #</th>
<th>ADVANTAGE</th>
<th>DESCRIPTION</th>
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<tr>
<td>1</td>
<td>Intra-PBX routing</td>
<td>This feature allows calls to be processed in the switch rather than entering the public network — thus freeing up external lines for revenue-generating calls.</td>
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<tr>
<td>2</td>
<td>Special number routing (0+ routing)</td>
<td>This facilitates the routing of special types of external calls, such as 800 numbers, to a particular trunk or carrier. This saves money in the process by bypassing the local exchange carrier and increasing commissions.</td>
</tr>
<tr>
<td>3</td>
<td>Local calls inhibited</td>
<td>This gives you the option of not creating call records for local calls made from the property. As such, those properties that do not charge for local calls save on printing costs and reduce the number of call records being processed. For security and call accounting accuracy, records are always stored for 411, 611 and 911 calls — even with this feature enabled.</td>
</tr>
<tr>
<td>4</td>
<td>Seconds displayed on station message detail records (SMDRs)</td>
<td>This feature provides for extremely accurate call accounting. Basically, the call duration can be monitored down to the second for each call record as well as built-in answer detection.</td>
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Some of the advantages of the "best-of-breed" products are as follows:

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<th>ADVANTAGE</th>
<th>DESCRIPTION</th>
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<tr>
<td>1</td>
<td>Best-of-breed products</td>
<td>Some companies specialize in CASs. As such, their products are typically rich in functionality and are able to provide features that are not typically found in intra-PBX CASs. For example, event call accounting modules are used to manage meeting room usage, which is typically set up on a manual basis.</td>
</tr>
<tr>
<td>2</td>
<td>Better reporting functionality</td>
<td>Some of the systems allow the ability to customize reporting. This allows for detailed specific reporting that can enhance revenue-generating efforts.</td>
</tr>
<tr>
<td>3</td>
<td>Easier to set up</td>
<td>Many of the call accounting systems can be set up and maintained on a relatively easy basis. In some cases, the software is actually installed by on-site hotel personnel.</td>
</tr>
<tr>
<td>4</td>
<td>Works with virtually any telephone system</td>
<td>Because the CAS functions through a one-way interface that receives SMDRs from the PBX, there is usually the ability to work with all PBX systems.</td>
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Some of the advantages of “external” systems are as follows:

**Enterprise-wide CAS**

Enterprise versions of CAS can operate across networks to support multiple properties and locations. This allows for the centralized management of telephony and communications accounting operations for geographically dispersed locations.

The application is loaded on a centralized server and operates on “thin-client” terminals at each of the hotel locations. This reduces the number of individual client software installations and technical support personnel required to maintain the application. In addition, the enhanced reporting capabilities provide for consolidated enterprise-wide tracking of phone revenue and expenses. Phone usage also can be closely monitored.

Advantages of enterprise-wide call accounting include the following:

- *The ability to standardize pricing with ease* - all changes are made on a centralized basis.

- *Ease of application management* – only one change is required to change the pricing for all hotels.

- *Centralized reporting* – reporting can be generated for all locations, thereby allowing for comparative analysis of information in a more effective manner across the board. This enables the control of an important revenue-generating application such as call accounting from a central location and should lead to increased profitability and more dollars added to the bottom line.

**Setup of Call Accounting Systems**

Because call accounting systems are revenue generators, the following features should be taken into account when setting them up:

**Guest Charges**

A hotel needs to determine what kind of markup (if any) it wishes to impose when guests are making calls from their rooms, meeting areas or public areas. In other words, what is the actual cost versus the “retail guest cost” of each phone call made by a guest? Some systems allow for the close monitoring of a hotel’s actual costs while still using standard, nondiscounted rates for guest calls.
Long-Duration Calls
Because of the proliferation of guests checking their e-mail and surfing the
Internet via dial-up modems on their laptops, many hotels now charge for local
and toll-free calls that exceed a specified time limit since these calls tie up
trunk lines and affect the overall telecommunication costs to the hotel.

Area Codes
In many of the older CASs, it was necessary to input all of the local prefixes
to price local and local long-distance (intraLATA – see the Appendix) calls
correctly. Intralata calls are those that take place between local service areas.
Most newer systems perform this function automatically when the local area
code and prefix are entered into the system. The system uses the phone number
to determine your exact location and automatically configures the necessary
area codes and prefixes for your area.

Guest Extensions
As with area codes, some CASs are able to set up the guestroom extensions
automatically. As such, only the administration extensions need to be
configured. This obviously works with hotels that have a uniform system of
numbering for guestrooms.

Maintenance of Guest Markups
Maintenance of markups and surcharges on guest calls has become a relatively
easy task on many of the systems. The maintenance usually is performed by
one of the following methods:

- By the software application company as part of its maintenance
  agreement
- By the telecommunications vendor
- By in-house personnel such as the MIS manager or
  telecommunications manager.

Usually the pricing involves any combination of markups and surcharges to
local, local-toll, in-state, long-distance and international calls. The rate tables
usually are obtained from one of the major carriers. However, properties also can
build their own tables and can even customize charges for conference/meeting
room calls or VIP guests.

Call Accounting Alarms
Most CASs have the ability to notify essential personnel of items that require
immediate attention. This can range from an emergency 911 call placed from a
guestroom to notification that the system is no longer posting to the PMS. The
system usually has a number of methods available for communication:
E-mail notification – the CAS can send e-mail to designated staff members, notifying them of the PBX and PMS status and emergency phone calls.

Visual indicators – these include a message printed on a printer as well as a screen notification or broadcast to key personnel’s computer screens, as well as a message alert on the actual CAS itself.

Pager notification – the CAS can notify designated staff members’ pagers to let them know that the system is off-line or that a 911 emergency call has been dialed.

Speaking alarms – in addition to having standard audible alarms, some systems can alert a manager to a problem by a voice prompt.

Call Accounting Management and Reporting

Call accounting now provides sophisticated reporting that allows the hotel to manage telecommunications use effectively throughout the property as well as the revenues it can generate from reselling the services. The reports can analyze guest and administrative telephone usage and determine profitability levels, and they can be viewed, printed, saved to disk or e-mailed to other users.

Among other items, the reports can be used for the following:

- Detailing specific extensions, administration extensions and usage by department
- Analyzing telephone profits
- Documenting dialed numbers, longest calls and so forth
- Monitoring and analyzing trunk usage and incoming and outgoing calls
- Reviewing night audit summaries.

The reports can be used to help determine the optimum allocation of resources and the most effective measures for saving money. In addition, the reports can be automated through various macros and can be printed or e-mailed automatically on a daily, weekly or monthly basis. This feature is especially useful for hotel companies with centralized offices that wish to track telephone usage and revenue for their hotels from a remote location.

Convention/Meeting Room Billing Modules

Traditionally, the billing for convention and meeting room telecommunication services has been accounted for manually. Alternatively, the lines have been dedicated to a particular area and the CAS has been set up to report on those lines independently and with very little control. However, there are systems that can assist convention and meeting space managers in managing all of their event charges for labor, equipment, telephone and bandwidth usage efficiently and accurately in real time from a single system.
These systems allow managers to maintain, track and control their inventory; to set up events; to assign equipment and telephone services; to charge for labor, taxes and installation; and to generate work orders from one central location. The result is that the charges for services can be individually priced and controlled, and collected at the close of every event. The delay in collecting the receivable is minimized by generating an on-demand comprehensive invoice that includes all the charges incurred by the group, including the call record detail. As a result, revenues can be maximized by being able to control the markup on the function space and the expeditious collection of monies following the event.

**Frequent-Guest Programs**

Some hotels and management companies are starting to reward their frequent guests with programs that offer free telephone calls during their stay with the hotel. As such, the interface between the PMS and call accounting needs to accommodate those guest preferences.

**VIP Guests**

Some call accounting systems allow for the provisioning of VIP guest programs. Guests who are considered to be VIP guests of the hotel may have their calls priced differently from those of regular guests, such as long-distance calls priced at cost, or no time limits on local calls. With this feature, hotels can really customize their call accounting program to enhance their operational policies and procedures with regard to VIP guests.
VOICE-MAIL SYSTEMS

In today’s environment, almost all hotels are expected to provide integrated voice messaging systems for use by their guests. A guest messaging system (voice-mail system) allows guests to receive calls and messages even when there is no operator on duty. Today’s voice-mail systems have to interface to both the PBX and the PMS.

Voice-mail systems allow callers to leave detailed private messages in their own language so that the mood and urgency of the caller are expressed in every message. Guests also may be notified via the voice-mail system of text messages or faxes received at the front desk. Voice mail allows callers to leave messages for guests without having to go through the hotel operator directly, freeing up operators to provide personal assistance to those who need it. Voice mail also leads to improved staff efficiency, allowing hotel workers to leave detailed messages for each other that can be retrieved at various times of the day. As such, service is not interrupted because of shift changes and other things. In addition, mobile personnel such as housekeepers and maintenance can be alerted via a pager or cell phone to call in for a message. In some cases, rotating DIDs can be controlled via the voice-mail system.

Hospitality Features and Functionality

Typically, the features that relate to the hospitality industry include the following:

   Automated attendant – Used by some hotels to assist or replace the PBX attendant, providing for the automatic answering of calls to the hotel. The more sophisticated systems respond to voice-activated responses.

   Room transfers – An important feature allowing guests’ voice-mail box to follow them in the event of a room transfer.

   Room messaging – Provides guestroom voice messaging.

   Wake-up calls – Allows guests to place wake-up requests through the system.

   Message-waiting indication – Turns the message-waiting light on and off to indicate when a guest has a message.
**Text messaging** – Turns the message-waiting light on and prompts a guest when he or she has a text message that was recorded manually in the PMS.

**Check-in/check-out voice-mail box maintenance** – Assigns a “new” voice-mail box when a guest checks in and clears all old messages upon the guest’s check-out. It is important that the message box be clear upon check-out to avoid having the new guest gain access to an old guest’s voice-mail messages. This could make the hotel liable for any consequential damages in this regard. Some systems have the capability of keeping guest voice-mail boxes open even after a guest checks out. The messages then are stored for a predetermined period of time before being cleared out.

Voice-mail systems are available in both analog and digital forms. Most of the digital systems are typically built into the PBX architecture and are either a feature of the system or closely integrated into the PBX. As such, many of them are proprietary in nature and may only work with a specific system. Analog systems are usually third-party systems that are interfaced to the PBX, and they operate with several PBX manufacturers’ systems.

**Speech-Enabled Systems and Unified Messaging**

In the future, look for the following features to play an important role in hospitality-related voice-mail systems:

**Speech-enabled attendants.** These will become a fixture of corporate-styled hotels. Callers will be able to say a guest’s name and be connected to that room. Currently there are still issues associated with callers being connected to incorrect rooms for a number of different reasons. This can lead to guest dissatisfaction and potential legal issues.

**Unified messaging.** This allows for the interaction of voice mail and e-mail so that a guest can retrieve his or her voice mail via e-mail, and vice versa. Technically difficult to implement at this point with analog systems, with the introduction of voice-over IP solutions this could become a common feature.

**Guest names.** This feature enables guests’ names to be sent to the voice-mail system at check-in, and it enables language and VIP indicators to be sent to the voice-mail system to provide more personalized voice-mail service for the guests.
AUTOMATIC CALL DISTRIBUTORS

In an era when time is such a valuable commodity, reservation and PBX departments cannot afford to place guests on hold for any length of time. Potential guests want to have their reservation or call handled immediately and it has become imperative that these departments have the necessary tools to manage incoming calls efficiently and effectively. In most cases, the most effective solution is to use an automatic call distributor (ACD).

Simply defined, an ACD routes the call that’s in queue longest to the first available agent, it distributes calls equally among agents, and it can route specific calls to specific agents based on the number called or the caller’s response to initial prompts. The ACD also helps manage trunks, agent stations and other equipment that integrates with it.

ACD Features and Functionality

ACD software automatically answers a hotel’s incoming calls with a voice menu, queues the calls and then distributes calls to the appropriate agents. It also can play announcements to on-hold callers. ACD software routes all incoming calls and contacts to the most appropriate agents, agent groups or interactive voice recording (IVR) recorded voice-message systems. Call routing can be based upon agent skills for skill-based routing, language, products, services and so forth.

*Uniform call distribution with queuing* – provides an even distribution of incoming calls to available answering positions.

*Dial intercommunication between ACD stations* – provides the ability for reservation agents to communicate between each other, thereby enhancing the ability for them to assist the inbound callers.

*Call transfer* – allows incoming calls to one agent position to be transferred to another.

*Call-origin announcements* – automatically identifies the geographic area served by the trunk group on which the call is received. The agent hears this information immediately after the “zip tone.” A zip tone is a sound sent by an ACD to alert the agent about incoming information or calls.

*Consultation hold and add-on conference* – allows an agent to establish a three-party conversation. The agent also has the option of keeping one of the two parties on hold while having a private conversation with the other.
**Make-busy arrangements** – makes terminals or stations appear busy to incoming calls. This is activated and deactivated on the customer’s premises by removal of the headset from its jack or, if provided, by separately mounted keys or keys in key telephones.

**Calls-waiting indication** – notifies agents of the number of calls waiting in queue.

**Delay announcements** – can be provided to calls held in queue for a customer’s specified period of time. The same or a unique announcement may be used for a second, third or fourth announcement interruption.

**Agent information announcement access** – allows agents to access and (with the proper authorization) modify announcement messages, to maintain current information for inbound callers.

**Full IVR integration** – allows for interaction based on voice responses to specific informational requests. Instead of pressing specific numbers on the phone dial pad, callers are able to “speak” their responses to questions.

**ACD incoming call management** – allows for call direction based on the number called and associated handling instructions. For example, if a caller has been dealing with a specific agent, the system may queue the caller to be directed to that particular agent. This allows for continuity with the calling party and may prove to be more efficient because the parties are familiar with a particular situation or guest preferences.

**Agent coaching** – allows for a supervisor to listen in on the call and in some cases talk to the agent without the calling party being able to hear the supervisor/coach.

**Silent observation by call center management** – again allows, in this instance, the supervisor to monitor a particular call without the caller and in some cases the agent knowing that he or she is listening in on the call. This is normally used for training purposes.

**Service supervising** – provides for the use of special access codes for customer-designated agent assist and/or call agent terminals that will allow supervisors to enter an agent conversation without notice.

**ACD automatic number identification (ANI)** – provides incoming ACD call identification information to the agent on all calls appearing at the console (including transfers).
Agent log-in – an optional feature for an ACD whereby an agent, by means of unique identification code, registers his or her identity at a particular ACD console before receiving or transmitting calls. This action of “logging in” allows the ACD to associate performance data, which is organized by console, with an individual agent, uniquely identified by his or her ID, thereby allowing management complete freedom in assigning the physical location of agents.

**ACD Reporting Functionality**

ACDs provide sophisticated telephone call management equipment to report on telephone traffic. Utilizing detailed activity reports from the system, reservations staff members can determine the service levels they are providing at any moment, as well as the levels that they have provided in the past. Furthermore, they can compare their actual performance with the objectives and goals established by operations. Managers usually focus on the following items when analyzing the information:

*Peak calling times* – this information allows managers to view the peak call periods so that they can staff their reservation/call centers accordingly.

*Blocked calls* – these data are only available from the local telephone company and usually can be obtained on a subscription basis.

*Abandoned calls* – these calls can only be determined if a call sequencer or an ACD has been installed.

*On-hold time before answer* – the hold time usually is based on a parameter of seconds and is based on call volume per hour. This allows management, for example, to provide a commitment to answer 90 percent of the calls within 20 seconds.

*Talk time* – this is the average amount of time that a reservation agent spends on a call. This usually varies based on the type of operation; budget hotels usually require less time than luxury establishments.

*Conversion rate* – these are the amount of calls that result in a confirmed reservation, usually represented as a percentage of calls received. Targets are once again established by operations. This provides management with a tool to evaluate agent performance.

*Calls lost due to lack of incoming lines* – this information can be determined from the number of lines maximized in the system on a regular basis, as well as from information obtained by the phone company.

*Callers who hang up before their on-hold call was answered* – once again, this usually is represented as a percentage.
ACDs also can be integrated with third-party systems to provide some unique solutions. For example, priority routing allows the reservations department to identify a high-value customer based on his or her ANI. When the number flashes on the screen, the call can be prioritized to expedite that call ahead of others.

Another option is routing based on a caller entering an identification number or account number into a voice response unit, for example, a guest frequent-stay card number. You also may wish to route calls based on the number the caller is dialing (the DNIS). For example, you may have a dedicated number set up for PBX, another for reservations and another for guest service.

A new trend in ACDs is the ability to incorporate skills-based routing. This routes each caller (and, perhaps, his or her appropriate data files) to the agent best equipped to handle the communication process, for example, a bilingual or multilingual agent.

**Maintenance and Support**

ACDs generally are complex systems; their proper maintenance and support are critical. As such, it is important to ensure that you have a long-term maintenance contract, which includes software updates and bug fixes. The telecom vendor should carry a complete set of spare parts that are stocked locally. The local vendor as well as the hotel also should have a good relationship with the manufacturer. That way, the hotel can access the manufacturer directly in the event that the local telecom vendor’s relationship with the hotel fails. It is also important to ensure that the local vendor has deep technical resources in the form of technicians trained on your specific system configuration. The system also should be configured for remote telephone support for the hotel system administrator and users.

If the hotel assumes the responsibility for system maintenance, and for phone-extension moves, adds and changes, it is important to ensure that the in-house personnel have the necessary technical knowledge and that the vendor can be relied upon for backup, if necessary. Ensure that the system documentation (both technical and user documentation) is current with the software version, and that it remains so. Regular retraining of staff also should be considered on an ongoing basis to ensure that the full functionality of the system is maintained.
Cabling

Cabling standards for use in hospitality buildings are unlikely to change dramatically over the next few years. For the foreseeable future, data and voice communications will use unshielded twisted-pair cables for data access to the desktop. Technological improvements in cabling have been incremental, such as the change from Category 3 to Category 5, and now Enhanced Category 5 (Cat 5e) copper cables. Category 6 cables are now available, but their long-range benefits are still unclear. Category 5 and 5e cables are designed to support gigabit Ethernet speeds, which are considered likely to be sufficient for many years.

Category 6 delivers the highest level of transmission performance available without individually screened pairs of wires, but its extra carrying capacity may be better reserved for specialized technologies at this time.

Fiber to the desktop presently costs more than Category 6, although future technology standards may focus on it as a better alternative. Although it’s still often used for network backbones, especially to link buildings in regions prone to electrical storms, for now there does not seem to be any significant trend toward more fiber to the desktop, and it remains a niche application.

It should be mentioned that although most current solutions only require a single pair of wires to ensure connectivity to the phone, the future use of voice-over IP solutions will require the termination of all eight wires in the four-pair cable typically installed.

The following represents basic definitions of some of the cabling standards:

<table>
<thead>
<tr>
<th>CABLE TYPE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two-pair cable</td>
<td>A cable that contains four wires arranged in two sets of two wires twisted together (not typically found in most environments)</td>
</tr>
<tr>
<td>Three-pair cable</td>
<td>A cable that contains six wires arranged as three twisted pairs (typically found in old environments)</td>
</tr>
<tr>
<td>Four-pair cable</td>
<td>A cable that contains eight wires arranged as four twisted pairs (typically found in current environments)</td>
</tr>
<tr>
<td>Cat 3 cable</td>
<td>Can support applications requiring a carrier frequency of up to 16 mHz and a data transmission rate of up to 10 Mbps</td>
</tr>
<tr>
<td>Cat 4 cable</td>
<td>Can support applications requiring a carrier frequency of up to 20 mHz and a data transmission rate of up to 10 Mbps</td>
</tr>
<tr>
<td>Cat 5 cable</td>
<td>Can support applications requiring a carrier frequency of up to 100 mHz and a data transmission rate of up to 155 Mbps</td>
</tr>
<tr>
<td>Cat 5e cable</td>
<td>Can support applications requiring a carrier frequency of up to 100 mHz and a data transmission rate of up to 1,000 Mbps</td>
</tr>
<tr>
<td>Cat 6 cable</td>
<td>Can support applications requiring a carrier frequency of up to 250 mHz</td>
</tr>
<tr>
<td>Cat 7 cable</td>
<td>Can support applications requiring a carrier frequency of up to 600 mHz</td>
</tr>
</tbody>
</table>
Feeder Cables
Feeder cables usually form the backbone of the cabling infrastructure. These cables usually are provided in multiples of 25 pairs bound in one cable sheath, and they connect the intermediate distribution frames to the main distribution frame.

Cabling Installation
The cabling standards usually are based on BICSI guidelines for closet sizes, pathways and types of cables. The current standard is to use four-pair Enhanced Category 5 cabling (which is capable of handling 155 Mbps ATM services over copper) to every outlet. This assumes, however, that all eight wires are terminated to achieve this throughput.

Distance Limitations
As a rule of thumb, twisted-pair copper Cat 3–5 cable has a distance limitation of about 5,000 feet (actually 5 km). The maximum distance is affected by a total allowable loop resistance (including phone or terminal equipment) and also by the PBX equipment or other equipment that provides power to the voice port. Most POTS lines have a distance limitation of 3 to 4 km. However, it is not recommended that systems be built or configured to the maximum distance specifications.

Intermediate Distribution Frames
Intermediate distribution frames (IDFs) are located in rooms on various floors throughout the building campus, and they are used to terminate and connect all data and telecommunications cabling from the end-user access points (phones or data jacks). IDFs then are linked to the main distribution frame through the use of copper or fiber feeder cables.

Termination Equipment

*Punch-down blocks* – these are racks of cable connection blocks (usually made out of plastic) that are used to connect telecommunications cabling by “punching” each cable into the jaws of a metal blade. Data cables usually are connected using patch panels instead of punch-down blocks.

*66 blocks* – these are the most common type of block used to terminate and cross-connect twisted-pair telecommunication cables. Most telecommunication providers utilize 66 blocks for their termination of individual POTS lines. Older hotels usually also have their infrastructure terminated on 66 blocks.

*110 blocks* – these are another type of cross-connect block that also are widely used to terminate and cross-connect telecommunication wires. Most newer hotels have their voice terminations on 110 blocks.
Fiber

Optical fiber cabling is widely used to carry broadband voice and data services over potentially long distances. The cable consists of a core of glass and an outer casing of plastic. Signals are transmitted through the cable via light; hence, the terms “the cable is lit” or “is left dark” are used to describe a fiber line that has been activated or that merely has been installed for future use without being connected. Although fiber cabling is far more sensitive (and in some cases costlier) to work with than traditional copper, it does have some advantages:

- Low data packet loss
- High-speed transmission
- Large bandwidth
- Small physical size
- Free from electromagnetic forces (unlike twisted-pair)
- Lightweight
- Not as susceptible to corrosion or water damage.
Figure 6: Different fiber cable termination connectors

**Uninterruptible Power Supply**

Uninterruptible power supply (UPS) systems are designed to provide constant power to the PBX and other electronic devices during a power failure, and to provide protection to the equipment when there are power surges and “spikes” that could potentially damage it. There are typically two types of UPSs:

*Standby or “off-line” UPS* – these have an electronic switch that senses a drop in main power and switches the device to the UPS. This normally only takes a few milliseconds and the equipment remains powered up during that time.

*In-line UPS* – these normally reside between the outside power and the telecommunications equipment, take power from the outside sources and “clean” it. As such, the UPS ensures that the PBX and other telecommunications equipment receive constant, clean power.

**Telecommunications Room Design**

When you are designing the layout of a telecommunications room, you always should take the following items into account:
Electrical Requirements
Be sure to identify the exact requirements of the PBX, voice mail and call accounting equipment, because each manufacturer may require unique power requirements for its switching equipment. As such, be sure to identify those requirements and ensure that the room is provisioned with the correct circuits and outlets. Most PBXs are attached to rectifiers; some rectifiers operate off 30-amp dedicated circuits and the rooms need to be provisioned to accommodate them.

Air Conditioning
Be sure to identify the British Thermal Unit BTU output and cooling requirements of the PBX and all of the peripheral equipment from data provided by each PBX manufacturer. It is important to calculate the maximum load to ensure that the room is adequately cooled in accordance with the manufacturer’s specifications.

Telco Provider Requirements
Typically most telco providers require a backboard of at least 4 feet by 6 feet attached to the wall to hold their termination equipment. This consists of binding posts or punch-down blocks (to terminate their feeder cables), T1 and PRI termination boxes and other proprietary peripheral equipment. It is also a good idea to provide some 110-volt power outlets for peripheral equipment that may be attached to the wall, such as CSUs or DSUs.
Figure 7: Sample telecommunications–data center
Figure 8: Sample layout of the telecommunications equipment with cabling and punch-down blocks
Like any system, telephone systems require maintenance to keep them functional. Because of the 24/7 nature of the hospitality business, it is important that communications downtime be kept to an absolute minimum. Equipment must be covered by an effective maintenance agreement, and the vendor selected to service it must have the necessary knowledge and technical skills required to support the particular hotel’s environment.

Vendor Selection
The key to any maintenance program is the level of service received from the system’s primary vendor. When selecting your preferred vendor, the following key factors should be taken into account:

References from current clientele. Although this will not ensure that the hotel will receive a high level of service and technical skills, references from other clientele will provide a good guideline as to what might be expected in this regard. It is important to obtain references from other hotels in the same area whenever possible.

The number of qualified technicians in the area. In the event of an emergency, it is important to know that the technicians servicing the account have the skills needed to address the problem.

The number of hotel clients in the area. Although the technician may be familiar with the technical aspects of the switch, he or she may not be familiar with the hotel business and as such, the switch may not be provisioned correctly.

The location of the local office. If the office is a considerable distance from the hotel, it could potentially affect the response time to service calls and ultimately lead to a greater downtime.

Ability to escalate the repair of a system. In the event that the technicians require additional resources, do they have the authority to escalate the level of support and obtain the necessary help in an efficient and timely manner? You need to determine this.

Defined emergency response times. The maintenance agreement must specify emergency response times, usually a two-to-four-hour on-site response time for emergency calls. A system emergency usually is defined as a certain percentage of line outages, but each contract is unique in this respect.
Remote System Administration

In today’s networked environment, systems often can be accessed from external networks. It is therefore possible for them to be administered across a WAN or via a “dial-in” connection. This access is not limited to digital PBXs; analog PBXs are accessed via modem dial-in from remote locations as well. Although there may not be a tremendous amount of system administration required by most hotels, systems can be managed from a central location.

Vendors also have a multitude of tools available at their disposal to monitor systems and address problems before they affect the uptime of the system. These include the following:

Remote monitoring of input-output controller (IOC) ports. This allows centrally located technicians to remotely monitor multiple properties’ input-output conditions.

IOC initialization. This allows the interfaces for the PMS, VMS, CAS and answer detection to be evaluated, initialized and reset. It can take place either on-site or from a remote location (in some cases without reloading the entire system).

Online alarm notification. The system will automatically notify the vendor of any malfunctions within the system’s hardware and software. Often-times the problem can be corrected online without the technician physically required to come on-site. Alternatively, a technician can be dispatched in advance of the service call from the hotel.

Online moves, adds and changes (MACs). In the event that some programming changes need to be made by the vendor, the technician can perform the changes remotely, thereby reducing the cost of having the technician come on-site to make the changes. This can, in many cases, be implemented on an immediate basis, thereby avoiding potential delays associated with having a technician make an on-site service call.

System Administration

In the past, most of the system administration and basic MACs had to be performed by the system vendor. Today, user-friendly software has been introduced into the environment, which allows for some of the basic system administration to be handled on-site by the hotel. Although the hotel technical staff still needs to be trained on how to administer the software, it does provide hotels with greater flexibility.
When a guest has an emergency in a hotel room, dials 911 and is connected to an emergency operator, the way the hotel’s telephone system is set up will determine how quickly emergency services are able to respond to the situation, and it can mean the difference between life and death. There are two types of 911 notification systems — traditional 911 reporting and E911 reporting.

Traditional 911 Reporting

If the PBX routed the call over normal central office trunks, it will be sent to the public safety answering point (PSAP) assigned for that area — the “emergency operator.” The operator will try to talk to the guest to determine the nature of the emergency and to confirm the caller’s exact location, in more detail than the main billing address of the associated number. However, the operator will not be able to ascertain the exact room number from which the guest is calling. Should the guest not be able to provide that (as the case may be with a heart attack), emergency personnel will be dispatched to the hotel but will not know the location of the ailing guest.

Thus, when the emergency personnel arrive on the scene, they will have to check in with the front desk or the security department to see if they know the location of the emergency call. In many cases, the CAS can identify the extension from which the call was placed, but only after the caller has actually hung up the phone. (The PBX only will forward information to the CAS once a call has been completed.) Because many 911 call procedures require the caller to stay on the line, these emergencies are never brought to the attention of the hotel staff until the emergency crews are on-site, and valuable time is lost in searching for the guest. Hotels have been sued as a result.

E911 Reporting

If the hotel PBX is equipped with E911 capabilities, the PSAP may be provided specifics on the location of the extension that the call was placed from, as well as “zone” information and other important data. In addition, the hotel staff will be notified of the call and will in many cases have provided assistance prior to the arrival of emergency services personnel.
911 Legal Requirements

Although there is currently no federal mandate that governs the use of 911 reporting, regulatory initiatives by several individual states and pending action by the Federal Communications Commission (FCC) require that the exact location of a 911 call from a phone connected to a multi-line telephone system (MLTS) such as a hotel PBX be provided to emergency response personnel.

Some major loopholes do still exist with regard to the E911 service and are currently being addressed by the FCC and state regulatory authorities. Following are a couple of examples:

1. How each individual hotel deals with emergency 911 calls from an operational standpoint.

2. The increasing use of cellular telephones and other wireless technologies and the need to trace a call to a particular location within a cell.

It is important to note that currently, emergency services are managed typically by local authorities. As such, the authorities in each hotel’s location will need to be consulted to determine the exact E911 reporting requirements.

Use of Direct Inward Dialing Numbers and E911

A Typical E911 Setup

If a hotel has a PBX equipped with E911 capabilities, a call placed from an MLTS not only will report the specific room number to the PSAP but also will alert the hotel staff to the emergency.

Basically, what the emergency service organizations are requiring is that hotels acquire DID numbers for each of the extensions that are located at the hotel. Those DID numbers then are permanently assigned to the extensions and are entered into the Public Safety Automatic Location Identification (PSALI) national database. This database associates telephone numbers (including DIDs) with locations including street addresses and other information such as the hotel room number and particular zone number, if applicable. In most cases, it is the hotel’s responsibility to ensure that the database is accurate and kept up-to-date.

In many cities, the emergency services requirements now include that all new properties provide full E911 reporting capabilities.
Setup and Provisioning of E911

As mentioned earlier, a unique DID number is associated with each extension at the hotel. This includes administrative, guest and house phone extensions, including the second line found in most guestrooms. The unique DID number does not necessarily have to correspond with the individual phone extension in the hotel. Many of today’s PBXs can use a single DID number for each guestroom as the PBX can provision the same DID number for both extensions. This reduces the number of DIDs that the hotel has to provide for the service, which in larger properties amounts to considerable savings over a long period of time.

Providing individual DID numbers for all of the extensions in a hotel is somewhat contrary to the premise that the “in-house” PBX should be able to identify the individual extensions programmed for the property. However, the limitation is actually on the national database of numbers accessed by the various local emergency services departments. They need to be able to identify an individual extension’s location within their database, and the only way this can be done at this time is to assign a DID number to that extension.

Hotels Provisioned with an Integrated Services Digital Network PRI

Hotel PBXs usually are connected to the national and local emergency services database through the use of PRI circuits to the central office switched networks. In most cases, 911 calls are made through the PRI’s setup for local calls. When a person dials 911 from a phone, the PRI’s digital channel processes the DID associated in the PBX with that particular extension and sends it to the PSAP. The software at the PSAP resolves the phone number and provides the 911 operator with the specific location of the origin of the call.

![Diagram](image)

Figure 9: In cases in which the central office is not able to resolve the DID numbers via the use of a PRI or Centralized Automatic Message Accounting trunks, a third-party translator is required.
Hotels Provisioned with POTS Lines

Smaller hotels that are provisioned with POTS lines still can have their PBXs provide the DID numbers and information to the PSAP through the use of Centralized Automatic Message Accounting (CAMA) trunks. As such, the 911 operator still will receive the same information provided through the PRI.

Note: Depending on the switching infrastructure of the telecommunications provider, it may not be able to provide the required E911 reporting via the Integrated Services Digital Network (ISDN) PRI. In these cases, the use of CAMA trunks may be required. In addition, there may be a requirement for the use of third-party E911 software to communicate between the PBX and the CAMA trunks.

Voice-Over IP Solution Challenges

Voice-over IP (VoIP) solutions create their own special challenges associated with the fact that MACs can be done through software changes and thus are difficult to track.

The issue is that VoIP PBXs are not directly linked to the national PSALI database, which must therefore still be updated on a somewhat manual basis. This requires that the local database administrator keep track of the MACs to the various extensions so that the PSALI database can be updated at the same time.

In addition, some of the wireless applications allow for users to be mobile and it is difficult to keep track of a “moving target.”
SYSTEM SETUP AND FUNCTIONALITY

Management of the telecommunications at a property can mean the difference between merely providing a service and bringing dollars to the bottom line. The following represents some of the areas that can enhance the level of guest service and satisfaction while also protecting the profits of the corporation:

**Least-Cost Routing**

The least-cost routing (LCR) feature should be programmed into the PBX to ensure that it uses the lowest-cost method for connecting a call over a long-distance circuit. Very often, hotels will be provisioned with PRI and T1 circuits from different providers, and the rates associated with the different services may be more attractive on one circuit than another.

As an example of an LCR setup, a property set up with the following circuits:

- Two PRIs for local and long-distance service
- One T1 for local long-distance (intraLATA) and long-distance service
- Backup POTS lines for overflow and redundancy

could be configured for—

- **Local calls:** PRI
- **IntraLATA calls:** T1
- **Long-distance:** T1
- **International:** Second PRI
- **Operator services:** Backup POTS lines (assuming the T1 provider was not an O+ provider)

**Answer Supervision**

Traditionally one of the biggest issues affecting disputed guest calls is the guest’s statement that he or she did not connect on the phone calls. In the earlier days of call accounting, the CAS only began billing after a specified time had elapsed (usually 50–60 seconds) to allow for calls that weren’t connected. Even then, guests complained that they did not connect with their intended recipients. Since then, many carriers have introduced answer supervision to their networks to provide confirmation that the call was connected. Although answer supervision works in most cases, it is still recommended that CASs be programmed with a timing threshold to catch calls that might “slip through the cracks.”
Fraudulent 800 and 900 Calls

Even though most hotels place “call blocking” on all 900 numbers, many still are hit with excessive charges from calls that actually are placed through an 800 number but are immediately forwarded to a 900 number. The hotel then is billed for the time that the guest spent on the phone. The guests, however, are not billed as the call is registered as an 800 toll-free call. These charges can in some cases amount to $14.95 per minute and can end up costing the hotel large sums of money. Because these numbers are constantly changing, it is very difficult to prevent them from being billed to the hotel.

There are, however, some actions that hotels can take to address the situation:

- Some CAS vendors provide a list of such auto-diverting 800 numbers collected from a database, which they then program for call blocking on a regular basis.
- A letter can be sent to the FCC requesting that all the lines be programmed to restrict access to information provider services. Most hotels already are paying for a special type of toll trunks, which have specific call restrictions on them.
- Hotels can contact their local exchange carrier to see how the situation can be addressed.
- Monthly phone bills can be monitored to ensure that those charges are located and challenged.
- New call accounting software in development will be able to match the guest call record to the actual invoice from the phone company. As such, there will be a way of determining which guest made the phone call, which would allow the hotel to back-bill the guest for the call.

800 Information Calls

800 information calls also can be very costly to a hotel. Basically there is a charge from the 800-number providers for providing the toll-free number requested by the guest. If it is outside of the local calling area, it can amount to $.75 for the service (in essence the same as your long-distance provider). However, the real problem arises when the operator asks the guest if he or she would like to be connected. The call then is treated as operator-assisted, with the initial minute cost of $3.37, plus the $.75 initial charge, plus $.27 for each additional minute. Rates are even higher for international calls; the initial information charge jumps to $3.00 from $.75 and the initial minute charge is $7.75 plus per-minute charges of between $1.22 and $4.50. The guest, on the other hand, is not billed, as the CAS interprets the call as toll-free. In this case, the best advice is to block these numbers from your PBX.
Hotels used to be considered among the lightest users of outside trunking — the number of outside phone lines needed per building occupant — compared with office buildings, for example. This has changed, however, because portable laptop computers came into use. Although guests may only make a few phone calls, they connect to the Internet via modem to check their e-mails, download presentations or conduct research on the Web, spending far longer on the phone than before and reducing the number of lines available to other guests. As a result, PBX trunking requirements have increased. In addition, providing a second line for guestroom phones has increased the port count on systems. Coupled with the additional demands from in-room amenities such as voice mail, caller ID, wake-up calls, multilingual greetings and teleconferencing, this has resulted in owners having to invest large sums of money to upgrade or replace existing PBX technology.
INTERFACING REQUIREMENTS

One of the key differentiators between hospitality telecommunication systems and those of a traditional business environment is that the systems have to interface to the main PMS. In addition, the main components of the telecommunication system have to be either interfaced or integrated among themselves to function correctly. Let’s examine the various relationships and associated functionality:

Property Management System Interface Requirements

With the PMS focusing on guest-related service, the following features need to be provided:

PBX

Guest name display – registers guest name in the PBX, which allows staff to address guests by their name when they call from the room.

Check-in – unrestricts phone access (usually just outside calling capability; the phone is kept open for calls within the property).

Check-out – restricts phone access to outside dialing.

Maid status of clean and vacant rooms – housekeeping attendants and inspectors dial in to the PBX from the guestrooms to update the room’s cleaning status. These status changes are passed to the PMS, reducing the time between when a room is cleaned and when it’s made available to the front desk for resale.

Voice Mail

DID rotation – rotates the pool of DID numbers if used in conjunction with the voice-mail system.

Check-in – sets up voice-mail box for guestroom.

Check-out – clears voice-mail box of messages to prevent incoming guests from receiving the previous guest’s messages.

Room transfer – should a guest be transferred to another room, his or her voice-mail box can be moved to the new room, carrying over previously saved messages.

Text messaging – notifies guests that they have a text or written message that they can retrieve at the front desk.
Call Accounting

*Posting of phone charges* – posts guest phone calls to their folio.

*911 emergency notification* – notifies the front desk and other designated departments of any emergency calls made by guests.

*Frequent-guest programs* – some hotels offer free telephone calls during a guest’s stay with the hotel.

Future Interfacing Features

Future interfacing features will be needed once voice-over IP technology becomes prevalent, including the following:

- Identification of guest preferences
- Preprogramming of guests’ speed-dial numbers such as their office and home
- Folio review
- Unified messaging and the ability of guests to review their own text messages
- Indication of room extension numbers for other members of the guest’s group.

The interfacing of the PBX, voice mail and call accounting mainly addresses the call forwarding of inbound calls and the turning on and off of message-waiting lights.

In the future, the trend will be for most of these systems to be integrated rather than interfaced with one another. IP-based systems automatically will gravitate to integration that will in turn lead to greater expandability and stability within the various applications.
The hospitality industry is in many ways a very challenging environment when it comes to managing telecommunications. Because of the complexity of some of the PBX systems and the surrounding infrastructure, it is imperative that hotels employ telecommunications vendors who know and understand the environment. It is not only important that the system be set up to maximize functionality and uptime, but also to streamline the overall operating costs.

**Vendor Selection**

When evaluating the services of a telecommunications vendor, there are a number of things for which to look:

(a) How knowledgeable does the vendor appear to be when confronted with questions?

(b) Does he or she specialize in the hospitality industry?

(c) References: What other hospitality clientele does the vendor support? The company’s track record can be a key determinant of the quality of its workmanship.
   - Ask for references of other properties similar in size and setup to that which is being managed.
   - Be sure to ask for contact names and numbers that can be called.
   - When calling references, ask about the vendor’s response time to support calls. What is their overall impression of the vendor?

(d) Where is the vendor’s closest support office located? To have a two-to-four-hour response time, it is important that the company have a support office located in the area.

(e) Who will be servicing the account? In many cases, vendors will subcontract out the support of the system if they do not have their own support office in the area. If this is the case, it will be important to obtain additional information on the subcontractor.

(f) How well equipped is the local support office? If a major component of the system were to fail, how long would it take to replace? In most cases, it is advantageous for the local support office to carry a
complete set of replacement parts for the system to reduce downtime.

(g) Are the support technicians certified to support your system?

(h) Are they familiar with the setup and integration of all the key components of the system?
   - PBX
   - Voice mail
   - Call accounting
   - ACD

(i) How familiar is the vendor with the setup of the hospitality-specific software and features and E911 reporting?

Because of the fact that communications play such a key role in the hospitality environment, it is very important that the property have the utmost confidence in its vendor to ensure that the system remains up 24 hours a day. This often can be the difference between life and death in emergency situations.

Oftentimes, it may benefit a property to enlist the services of a hospitality-specific telecommunications consultant to assist it with this key decision.

**Contract Negotiation**

Telecommunications contracts usually are made up of two components — initial installation of equipment and components, and support.

**Equipment and Installation Contracts**

When negotiating support contracts, it is important to take into account the following:

*Pricing.* Price is normally one of the biggest negotiable items when it comes to evaluating contracts. Obtaining multiple bids from different vendors is used often to identify the best deals, but it is important to realize that price is not the only consideration. Vendor experience and reputation often are more critical than having the lowest price.

*Payment plans.* Very often, contracts stipulate payment terms that ensure compliance by the vendor. Withholding final payments until certain criteria have been met provides the hotel with an “insurance policy” against vendors who fail to deliver what was promised. An example would be a 25 percent deposit, followed by 50 percent on delivery of the equipment,
15 percent at cutover and 10 percent upon final delivery and acceptance of the system.

Moves, adds, and changes. Most installations usually have a period of time where there are many changes to extensions and system configuration attributable to “tweaking” the system. The period for performing MACs associated with installation should be defined carefully.

Leasing vs. capital expenditure. There are various advantages and disadvantages to leasing systems and equipment. Very often it depends on the availability of capital within the organization. As such, this decision should be weighed and evaluated by the management of the organization.

Limitation of liability. It is important to note that most of the contracts specifically limit the liability of the vendor when it comes to issues concerning the environment in which the PBX and other system components will reside. As such, the location that is selected for the telecommunication equipment must meet the environmental specifications laid out by the vendor. This includes protection against lightning strikes and other “acts of God.”

Equipment listing. The contract should contain a detailed listing of all of the equipment that is to be supplied by the vendor. This list should be reviewed to ensure that it contains the correct number of digital and analog station cards for your property, and the correct number of T1 and trunk cards based on the predetermined telecommunications usage for the property.

System expansion. Where possible, the system should allow room for expansion for additional analog and digital station cards, PRI and T1 circuits and central office CO trunk lines.

Responsibility for the programming of the phones. Is the vendor responsible for the preprogramming of phones or is it the responsibility of the property? Guestroom phone providers often provide the option of having the phones preprogrammed by the supplier prior to being shipped.

Installation and configuration. Vendors should break down their responsibilities with regard to the installation and configuration of the system. This should include a breakdown of all labor charges.

Training. The contract should stipulate the amount of training that is to be provided with the installation of the system. In addition, it should break down the training of the system administrator, the console operators and other users. It also should differentiate among the PBX, voice
mail, call accounting and ACD. (Some of the training may be provided by third-party vendors.) The proposal should include follow-up training after a period of time.

Warranty. Most systems usually will come with a warranty on parts and labor for at least a year. In some cases, it may be beneficial to negotiate a warranty for a longer period of time.

Future pricing of parts and labor. It often is advantageous to negotiate a maximum annual increase on the price of parts and labor. The precut and postcut pricing should be detailed or attached to the contract. That way, the property is ensured that it will not incur a dramatic increase in the price of supporting the system.

Future revisions of software. The property should request that any software revisions provided by the PBX and voice-mail vendors be included free of charge within the warranty period.

Interfacing with the PMS and other third-party vendors. The contract should detail the fact that vendors are responsible for coordinating their side of the interfacing with the PMS, call accounting, voice mail and other potential third-party vendors.

Breach of contract. The agreement should contain remedies for breach of contract by both parties.

Support Contracts

Once the system has been installed, the equipment must be maintained and fully operational on a 24/7 basis. As such, it is important to establish a support contract with the vendor to ensure that the system is supported in the event of failure. In this regard, it is important to address the following items within the contract:

Response times. Because of the 24-hour nature of the business, a rapid response time to support calls is essential. Contracts usually stipulate a two-to-four-hour emergency on-site response time. In addition, the contract should define what constitutes an emergency and establish the protocols for the various support calls. The contract also should include remedies for failure on the part of the vendor to comply with the response time.

New vs. used parts. Vendors often will utilize refurbished parts to support the systems. Although this can be common practice in a number of environments, the property needs to determine if this is an acceptable policy as it pertains to the support of its system. At the very least, the contract
should stipulate that if the number of instances of failure exceeds a certain threshold, then the property has the right to insist on having new replacement parts placed in its system.

*Use of certified technicians.* The contract may include that the vendor is required to utilize certified technicians when supporting the system.

*Use of subcontractors.* The contract should stipulate whether third-party vendors are intended to be utilized to support the system. If so, those vendors need to be listed and the property should check their references as well. The subcontractors should be governed by the same rules and requirements as that of the main vendor.

*Limitations on liability.* In most cases, the support contracts will not cover damage from lightning, political riots and so forth. The property should be aware of those limitations and where possible provide UPS equipment to try to protect against them.

*Support of guestroom phones.* Guestroom phones can either be supported by the in-house PBX support contract or by the hotel’s own maintenance department. In some cases it may be more cost-beneficial to maintain them in-house, or to just keep a stock of spare phones and swap them out as necessary. In either case, the contract should detail the various responsibilities.

*Support of telco services.* In many situations, the telecom vendor is responsible for maintaining all of the communication lines coming into the property. As such, vendors need to maintain relationships with the local exchange companies. Should this be part of their responsibility, then it needs to be clarified in the contract. (This includes the monitoring of T1s and local trunk lines.)

Once again, it is recommended that the property solicit bids and proposals from a number of telecommunications vendors to ensure that it is getting fair and competitive pricing and that it is receiving the best service possible.
Wireless Communications

Wireless technology is gaining popularity in the hospitality industry for a number of reasons, including the fact that it offers flexible portable solutions to a once static environment. It reduces the amount of hardwired cabling that traditionally has been required to be “connected,” and it introduces new functionality that benefits both the guests and hotel operations.

One option is to give users mobile phones that serve as personal extensions of their guestroom line. They then can use these mobile phones when they are off-site, thereby integrating cellular technology with the traditional hotel PBX. A special micro cell is installed on-site to route guest calls via the PBX to the preferred long-distance carrier, which may charge the hotel a low, flat monthly fee for unlimited airtime. Incoming calls to the hotel PBX are routed automatically to the mobile phone as long as the phone is located within the public wireless network service area. If the call goes unanswered, it is rerouted to the user’s voice-mail box on the system.

The term “wireless services” covers a wide range of different applications:

Public and Private Wireless Systems

This covers services such as cell phones, pagers, radio sets and personal communication services PCS phones that are operated on citywide or national networks and marketed by outside carriers. Public wireless services are no longer restricted to voice. There are public data networks — such as T-Mobile, Sprint, Verizon and other companies — that for a monthly fee offer relatively high-speed access to e-mail, the Internet and other data networks. This technology is in its infancy but is the focus of much research. In fact, with the introduction of wireless personal digital assistants (PDAs), many cell phone providers now are providing data services to allow their customers to surf the Web and receive e-mails, among other capabilities.

Another type of wireless service is called a private wireless system and uses a frequency licensed by the user. The best example is a trunked radio system, which typically utilizes the 800-MHz bandwidth range and which can service the entire hotel property or campus. Such a private wireless service can be stand-alone, or it may be interfaced to more traditional wire-based voice and data networks as a way of enhancing them.
Moving ahead fast in user popularity is wireless LAN service, using the unlicensed 2.4 GHz frequency. Widely accepted standards for this service (802.11b, 802.11a, 802.11g, etc.) mean that wireless access points and wireless cards are available from several manufacturers and are mostly interoperable. An 802.11b wireless LAN can operate at speeds up to 11 Mbps, although all of the users of this LAN need to share the bandwidth. 802.11a and 802.11g LANs run at 54 Mbps, but over shorter distances. Wireless LANs are designed to operate over a relatively small area, such as a floor of a building, although their area can be boosted by the addition of antennae. Care needs to be taken that adjacent wireless LANs do not interfere with each other. Wireless connectivity still poses possible security-related issues arising from the current technology; however, the security of the medium is improving at a rapid pace.

**Cellular Phones**

Cellular phones have become an important way for travelers to stay connected, and although they have definitely affected telephone revenues, it is important that hotels integrate them into their technology and focus on the guest satisfaction aspects.

**Call-Forwarding Service**

Many PBXs on the market have the ability to forward calls to a guest’s cell phone, instead of to voice mail. It is important to realize that this requires the PBX to make an outside call to connect the calling party to the guest’s cell phone. As such, there would be a cost associated with this feature, as well as the manual setup involved in programming the PBX to forward calls to the cell phone. Therefore, this is not an option that is widely used at this time. (See the note on cellular rental services below.)

**Enhancing Cellular Service**

One of the biggest problems affecting many corporate and large-scale properties is the lack of cell-phone coverage within their locations, largely because of the concrete and steel infrastructure of the buildings inhibiting signal coverage. Guests rely heavily on their cell phones to stay connected and get very frustrated that people cannot reach them when they are in hotels. LGC Wireless has a solution that can deliver service that allows guests to use any of the six major wireless companies: AT&T, Cingular, Nextel, Sprint PCS, T-Mobile and Verizon. Its service “boosts” the signal coverage within a hotel and allows guests to stay connected.
Cellular Rental Services

There are systems that integrate cellular/PCS telephones with the guestroom phone, thereby creating portable room extensions, allowing the cellular telephone to ring when the hotel room phone is dialed.

All wireless inbound and outbound calls are routed automatically through the system controller and the hotel’s PBX. Inbound calls sent to a guest’s hotel room (or direct-dial number) trigger a call to the guest’s cellular telephone. The call then may be answered by the guest either in his or her room or on the cellular phone. If the cellular phone answers, the room phone will stop ringing, and vice versa. If unanswered, the call will be forwarded automatically to either the hotel PBX operator or the voice-mail system.

All outbound calls made from rental phones are routed through the hotel’s PBX to the appropriate hotel extension. Outbound calls made to local or long-distance numbers use the hotel’s current land-line network to complete the call to anywhere in the world. All cellular call activity is tracked and automatically posts appropriate charges to the guest’s folio in real time.

The system also can connect to staff members’ cellular telephones, providing a seamless integration with their hotel extensions. Therefore, night managers, security, housekeeping, room service and other “must contact” staff members can be in continual contact with their guests without having to be tethered to their desk. For example, the night manager can roam the property and still be available for guests if a call is made to the manager’s extension. The hotel can use standard cellular phones that have a dual-ring function, allowing the normal use of the cellular telephones but having the enhanced feature of receiving calls placed to the staff extension.

Wireless Trends

Wireless voice products have become a commodity. Over the past few years, paging systems and cellular networks have been joined by PCS networks, digital cellular and trunked mobile radio systems such as Nextel. Other new innovations include networks such as Iridium, which use low earth orbit satellites, wireless fax, wireless telemetry (for activating sprinklers, etc.) and wireless line-of-sight point-to-point links. The latter sometimes are called “wireless fiber,” and although they are most commonly used for T1 links today, new products are being developed that will operate at optical carrier level 3 or 12 OC3 or OC12 speeds.
Currently, technologies such as the “Tsunami” wireless bridge provide a network connection between two Ethernet switches or routers located between 1 and 40 miles apart, and they can be a very cost-effective alternative to laying cable.

The demand for wireless voice services will continue to grow. Guests and administrative personnel will want to use wireless services. There also may be a demand for a single phone, using a single number, that can be used in the office as a business phone, on the move as a mobile phone and at home again as a business phone (for telecommuting).

The prices for public wireless voice services are coming down. It is no longer the case that wireless services such as cell phones and PCS calls come at a premium price. The cost of equipment and the cost of using that equipment will continue to drop, and within the next five years it will be as economical to use some types of wireless services as it will be to use traditional voice lines. Some services such as Iridium will, of course, remain specialized and high priced. It is less clear how future pricing will be for private wireless services such as wireless PBXs and wireless data networking devices. One would expect these prices to drop as well, but there does not seem to be any clear indication that this is taking place. Most of the future decisions that the hospitality industry will need to make regarding future private wireless services will center on cost. The question will be whether the new functionality is worth the money, and if the return from the guests (both return on investment and satisfaction) will warrant the hotel paying for it.

Wireless data access will become ubiquitous. Wireless data access is an application of great interest, and there will be a high demand for these services. Both wide-area wireless and 802.11 wireless access will be commonplace. However, wireless access will be significantly slower than wired access for the foreseeable future. Wireless is a useful complement to wired networks, but wired networks still will be needed for many types of applications.

PBX manufacturers are integrating wireless services into their switches. Companies have developed wireless PBXs. These are more correctly described as wireless additions to traditional PBXs, and they allow wireless PBX handsets to be carried around buildings or from one building to another. Companies are continuing to improve these products, although it often takes a while before they are introduced into the hospitality industry.

Because of the complexities of integrating guests’ private cell phones, the use of wireless PBX solutions in the hospitality industry is not that prevalent. Presently the use of wireless PBXs is used primarily for administrative and operational employee use. However, as technology improves, this will definitely prove to be the way of the future.
HIGH-SPEED INTERNET ACCESS

Over recent years, the demand for high-speed Internet access (HSIA) has become an important feature for hotels to offer their guests. Hotels have different ways to provide the service based on their wiring infrastructure, including the following:

1. New infrastructures, typically provisioned with Cat5e wiring and a 100-MB switching environment
2. Over-the-television coaxial wiring infrastructure utilizing cable modems
3. Via a Cat5e wired “loop” from some providers of in-room entertainment systems
4. Over existing Cat 3 or 4 telephone wiring utilizing very high data / bit rate digital subscriber line VDSL technology
5. Through wireless connectivity utilizing the industry standard 802.11x
6. Over an existing Cat 3, 4 or 5 solution utilizing the PBX and connectivity via the telephone.

There are quite a number of PBX solutions available on the market that now offer the capability of providing HSIA to guestrooms. They typically utilize Digital Subscriber Line (DSL) type technology over existing Cat 3, 4 or 5 cabling. However, some of the newer installations that incorporate VoIP-based technology utilize a traditional Cat 5 networking solution.

In many ways, it is easy to see why PBX solutions have been incorporated as a solution to providing HSIA to guests. First, they are already set up to connect to the outside telecommunications services provided by most of the local exchange carriers (LECs). Second, they are connected to the wiring infrastructure of the hotel, including the guestrooms. They also are interfaced to the PMS for billing purposes so that they can provide a revenue stream for the hotel, should the hotel policy be to charge for this service. In addition, they can be connected to the incoming Internet access via a T1 or DSL technology.

By utilizing DSL technology, the solutions are able to place a DSL modem in the rooms that allow the guests to connect their laptops to the Internet, thereby obtaining fast-speed connectivity via the existing phone infrastructure. What are the pros and cons for these systems?
## HOTEL TECHNOLOGY 101

### Telecommunications in the Hospitality Industry

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
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<tbody>
<tr>
<td><strong>DESCRIPTION</strong></td>
<td><strong>CONS</strong></td>
</tr>
<tr>
<td>The system can take advantage of the existing infrastructure — no new cabling requirements. It also can operate on existing Cat 3 wiring.</td>
<td>DSL modem components are expensive: $200 to $300 per room.</td>
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<tr>
<td>It is relatively easy to deploy.</td>
<td>DSL modems can be stolen from the rooms.</td>
</tr>
<tr>
<td>It has built-in billing service through the call-accounting interface.</td>
<td>There is an extra box/modem that fits under or is part of the guestroom phone — not that aesthetically pleasing and can be bulky.</td>
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<tr>
<td>Telecom and HSIA are maintained by one vendor.</td>
<td>DSL modem components are expensive: $200 to $300 per room. DSL modems can be stolen from the rooms. There is an extra box/modem that fits under or is part of the guestroom phone — not aesthetically pleasing and can be bulky. Many solutions do not include 24-hour user support.</td>
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A key question when purchasing new technology is how the system about to be purchased will address some of the emerging technologies constantly being introduced into the market. Some of those technologies follow:

**Voice-Over IP**

The PBX market currently is in the initial stage of transformation with the advent of IP technology — the technique of using it both for PBX call switching and for transmission of the signals to the telephones and other equipment using standard digital networks. This provides far more flexibility in handling voice calls and integrating them with data, transforming a hotel’s existing phone system. Factors driving customer expectations around IP communications include the following:

- Anticipation of savings resulting from convergence of voice-data networks based on open standard systems
- Rapid development of convergence and e-business applications
- Availability of enterprise-class communications, anywhere, anytime.

Features that previously existed only on people’s phones at their desk (such as their personal speed-dial numbers) can now be transported anywhere in the network. By simply logging into any IP phone within the network, the person’s profile is instantly available at the new phone location; there is no need to program the functions of the phone. The person can move freely from station to station, floor to floor, office to office, knowing that any phone that he or she logs into will provide the same features and functions as on the original phone. (This does require the same phone type and button layout.) Because IP extensions do not require a dedicated cable to run from the phone to the phone system, they could exist anywhere on the company LAN or around the world via the Internet, as long as the data connection is reliable and fast.

IP telephony is not just a matter of converting voice signals to data bits, although that is part of the process. Also involved are the call setup messages and the networking information — transparent to the end user — that make the convenience and ease-of-use possible. Thus, administrative staff members at a remote office on a campus-style hotel can enjoy and benefit from the features and functions of the PBX at the main building — voice mail, music-on-hold, telephone set displays, message lights and so forth — as though they were directly connected to the central site.
IP telephony is growing throughout the world as communications decision-makers begin to take advantage of the potential cost savings afforded by converged infrastructures. When most people talk about future advances in technology, the main issue is whether IP telephony — the network standard for voice, data and applications — will ultimately replace the traditional PBX at hotels.

It is widely believed that IP telephony will offer real-world benefits to the industry and will be used not only to provide additional functionality to the guest and hotel, but also to reduce costs. Most observers believe that the industry is headed in this direction, but that it is still a few years away, partly because of the current higher cost of IP-based guestroom phones and partly because IP still doesn’t perform many of the hospitality functions as well as the traditional PBX. Further, the Public Switched Telephone Network, which has a tremendous amount of capital invested in it, has a large installed base and is very reliable. Few people believe that there will be an abrupt switch to IP technology, but instead there will be a phased approach to the convergence of voice and data services.

These phases include the following:

**Phase One — IP Trunking**
Hotels will be able to utilize their data infrastructure for basic voice-over IP trunking, allowing them to create virtual tie lines that carry voice traffic over a data network. This will result in reduced trunking requirements and costs. In this phase, hotels still will continue to utilize their analog phones in guestrooms and their digital phones in the administrative areas.

**Phase Two — Voice-Enabled IP Endpoints**
This phase will introduce the use of voice-enabled IP endpoints such as IP phones, wireless phones, PDAs and other IP appliances. The integrated communications platform still would be able to accommodate all types of phones, including analog, digital and IP. The use of IP phones eventually will provide additional integrated capabilities to the guestroom that will provide greater functionality to the guest. Unfortunately, IP phones are in many cases cost-prohibitive in today’s environment. However, the cost of these phones is dropping dramatically, and in the future they will be feasible for guestroom use.

**Phase Three — System Networking**
This phase involves the integration of the PBX, voice mail and unified messaging into a single system that provides network-wide services across multiple hotels. Centralized IP systems will allow system administrators to manage all aspects of a distributed voice communications system from a centralized point.

**Telecommunications in the Hospitality Industry**
Some of the key attractions for the hospitality industry include the ability for guests to—

- Have speed-dial numbers for their home and office preprogrammed prior to check-in
- Do video conferencing
- Have high-speed Internet access
- Check their bill
- See the phone extensions of all other members of their group
- Call up a menu
- Check theater listings
- Reserve movie tickets.

The possibilities are limited only by the kinds and number of services that the hotel wants to offer.

In addition, look for the operational staff to take advantage of—

- Voice recognition
- Intelligent messaging
- Call routing
- Telephone-based access to PMSs.

The technology associated with IP-based systems opens the door for hosted voice services. Basically, telecommunications could become the next big opportunity for application service providers (ASPs), in which companies would host and manage hotels’ telecommunications systems. This would yield the same advantages as other ASP models, which include but are not limited to—

- Flat monthly rental or fee-for-service
- Reduced maintenance costs
- Reduced communication expenses
- No large outlays of capital.

In the hospitality industry, the transition to IP-based systems has already begun and is expected to gain momentum within the next 12 to 24 months as the current high cost of equipment comes down. The operational advantages are already recognized. The key thing to look for when evaluating the purchase of a new telecommunications system is that the platform will support new and emerging converged voice and data applications for years to come.
Some potential barriers to VoIP solutions include the following:

**Latency or delay.** IP technology breaks up a message into individual “packets,” sends them over various routes for the greatest efficiency and then reassembles them into the original message at the destination. For coherent conversation, voice packets must be transported from the originating point to the designated endpoint(s) on the first attempt at delivery. Congestion in the network can cause packets to back off from one route and attempt a second path. Unlike e-mail, where such delay may go unnoticed, latency can render real-time conversation unintelligible.

**Reliability.** Telephony networking equipment is measured against a reliability standard of 99.999 (called “five nines”) percent uptime, or full functionality — similar to what would be considered four stars in the hospitality industry. People are used to there always being a dial tone when they lift a telephone receiver; data networks typically have not been able to measure up to this standard. Putting telephony onto a data network could potentially compromise the availability of critical voice communications.

**Scalability.** Early IP telephony systems could manage only a fairly limited number of users on the network because of the impacts of additional traffic on the network. As such, VoIP solutions currently are limited to smaller hospitality environments.

**Security.** Hacking, denial of service and the diminished ability to ensure confidential conversations can potentially compromise the security of telephony when it travels over an IP network.

**Features.** Telephony features to which businesses have become accustomed — ranging from simply putting a call on hold to more sophisticated capabilities associated with contact centers — have been limited or lacking in some early IP telephony systems.

**Interoperability.** For a network to function, all of the individual components need to signal each other using a common language or protocol. Many traditional telephony systems as well as some IP telephony systems are “closed” or proprietary systems, which means that the signaling language or protocol is owned by a particular vendor who does not wish to make it available to other vendors. Equipment that is supported by a proprietary protocol is not tolerated within the network, which can limit the ability of a business to design a network that truly supports its needs. Industry standardization is helping to address this issue.
Large investments in circuit-switched equipment. Many hotels have significant investments and functionality in circuit-switched equipment. On its own, such equipment does not communicate well in an IP telephony network, although steps can be taken to IP-enable some items.

It should be noted that a number of hotel companies are adopting IP-based PBXs for their new hotels. Because IP-based systems require the termination of all four pairs of wires in a typical guestroom telephone cable, it can be difficult to implement in many existing infrastructures since some pairs may not be available. At this time, IP-based phones are being installed for administrative use, and IP-based systems are starting to be installed in new infrastructures.

Distributed Networks (Networked PBXs)

With the introduction of voice-over IP, there has been considerable talk about distributed phone systems, in which companies that operate multiple properties can use one centralized PBX for all locations. This technology currently exists but is not widely used because of the relatively high cost of the equipment necessary to support the infrastructure. Currently there are two ways of setting up a distributed PBX system:

Multiple PBXs Linked Together

In this scenario, a PBX is installed in each location, linked via dedicated lines to the main PBX at the central office. This solution is expensive because of the amount of physical equipment required; its only real advantage is the ability to manage and maintain the various systems centrally.
A Centralized PBX and Remote Switched Port Modules

This scenario uses a centralized switch, with each remote location having a remote switched port module attached to the main switch; the remote location is dependent on the main PBX for most of its switching functionality. There are limitations with this kind of solution. Usually the remote modules are connected via fiber links and have a distance limitation. In some cases, they can be attached via a point-to-point T1. In the hospitality industry, there is also the limitations of the interfaces to the PMS, voice mail and call accounting that have to be considered.

Although they are typically costly, distributed phone systems are advantageous under certain multi-unit situations, including the following:

- Reducing trunking requirements and costs
- Centralizing PBX operator functions and thereby reducing labor costs.

Computer Telephony Integration

Computer telephony refers to the integration of computers with electronic transmission of voice, fax or other information between distant parties utilizing systems historically associated with the telephone. Examples of computer telephony integration include the following:

Voice Mail/Voice Messaging

Voice-mail/voice-messaging systems provide call coverage and messaging services. Each person is assigned a voice-mail box where callers can leave recorded messages.

Unified Messaging

Unified messaging (UM) systems, also known as unified communications systems, provide a universal mailbox that permits users to retrieve, manage, store and forward voice mail, fax and e-mail messages via touch-tone phone or PC. From a PC, users can view a list of their messages and determine caller origin, message content and urgency. They can skip around to read or listen to the messages in their personal order of priority. From a desk or cell phone, users can listen to voice messages and have faxes and e-mails read to them.
More advanced UM systems offer features such as “find me” and “live reply.” The “find me” feature is beneficial to users who want to receive phone calls no matter where they are. PBX integration enables many of the inherent benefits of a unified messaging system based on the constant communication between the UM application and the PBX. The control data associated with each phone call are essential to the application to present call-related information on a screen or to ensure that the call is accurately completed.

Interactive Voice Response
Interactive voice response (IVR) allows customers to manipulate information in a computer database. In the future, guests may use IVR to retrieve their folio balance or text messages.
INTEGRATION OF EMERGING TECHNOLOGIES

There are numerous emerging technologies that will end up being integrated into the hotel environment. Many have been discussed throughout this document. Some of the more practical applications include the following:

Personal Guest Voice and Fax DID Lines, Assigned at Check-In

Although this is certainly not a new concept, automatically assigning a personal fax number and/or a direct voice number to a guest upon check-in became much more complex when emergency 911 location reporting became more common. This is because of the need to tie one of the hotel’s block of available-to-guest physical DID numbers on a rotating basis to the virtual DID number assigned to that spare extension in the guestroom. As a result, and combined with guests’ growing use of their own cell phones instead of hotel-provided DID numbers, usage dropped significantly. However, some newer technologies are making it more feasible again.

New Phone Technology

Phone manufacturers also are focusing on new technology and offering some new innovative solutions in this regard:

- Micro-processor vs. batteries. Batteries to maintain programming such as speed-dial numbers in guestroom phones need to be replaced about every four years. Phones with a micro-processing chip no longer require batteries for this, avoiding both inventory and battery replacement labor costs. The phones are powered from a standard 110-V outlet and the programming is retained in the flash memory.

- IP-ready guest phones. Guestroom phones now are starting to operate with CPU software–driven technology. As such, the phones are adaptable to any telecommunication network with minor modifications within the software settings, including IP networks and converged voice and data communications. This means that the new phones can be purchased in advance of the technology being introduced into the industry and be upward compatible.

- Preprogrammed phones. Manufacturers also are offering to preprogram the guestroom phones with speed-dial numbers and so forth, prior to shipment. This can help reduce programming costs that would ordinarily be charged by the vendor.
Video Services

One of the side benefits of IP-driven phones will be the ability to transmit video via the phones. As such, it will not be uncommon for videophones to become a common feature offered in hotels. Guests will, of course, have the option of turning the video feature on at their own discretion. The benefits of videoconferencing also will be realized at a greatly reduced cost. Currently this aspect of the technology is limited because of the speed of the networks both inside and outside of the hotels. However, as some of the Internet software improves, one can look for videoconferencing to resolve these issues. Currently there are solutions that utilize an ISDN line to facilitate videoconferencing.

Figure 12: Integrated IP-based phone with a PDA interface and sync
The technology world is a constantly changing environment and although we all want the “latest-and-greatest” features in the products we purchase, oftentimes what we really need is a product that works! This concept very much applies to the status of telecommunications within the hospitality industry. Although most people are looking to voice-over IP as the new technology for managing communications, this technology still needs to be proven and to be cheaper, and it will be a few years before it is widely accepted as an industry standard. Thus, it is important to focus on the proven technology and existing PBX infrastructure when considering new systems for your new locations. What is important is selecting PBX platforms that will accommodate the new voice-over IP technology, so that there is a clear migration path available and the initial investment is protected.

The following are some of the key items to focus on when purchasing a new telecommunications system:

- Ensure that the system manufacturer is stable and that it has a dedicated and clear technology migration path. Its platform must be able to accommodate future technology upgrades.
- Check that your vendor is stable, has the necessary expertise on hand and is available in your area to address all of your system needs and requirements.
- Ensure that your vendor has extensive hospitality experience. This is extremely important. Check those references!
- Price is not always the only consideration. If a system is installed badly, you will pay many times over for the vendor’s lack of experience and/or follow-through.
- Make sure that the selected vendor provides an extensive project implementation plan and timeline.
- Be sure to obtain pricing and warranty guarantees up front.

Clearly, with operations for the organization being very much centralized, it would be advantageous to try to take advantage of as much of the enterprise-wide solutions as possible. At this point in time, distributed phone systems are somewhat pricey. However, they may offer benefits in the areas of consolidated trunking and PBX operator staffing. There are definitely some advantages with regard to implementing an enterprise-wide call accounting solution (both intra-PBX and external).

In every case, the focus needs to be on obtaining the correct balance among the product, vendor, price and integration.
APPENDIX — TELECOMMUNICATIONS TERMINOLOGY

The following terms refer to items that typically are associated with the setup of services from the local phone companies:

Automatic Number Identifier (ANI)
An ANI allows for the transmission through the network of the billing number vs. the actual telephone number of the calling party, thereby allowing the identification of the calling party’s name (among other things).

Competitive Local Exchange Carriers (CLECs)
In the United States, a CLEC is a company that competes with the already-established local telephone business by providing its own network and switching. The term distinguishes new or potential competitors from established local exchange carriers and arises from the Telecommunications Act of 1996, which was intended to promote competition among both long-distance and local phone service providers.

Customer Service Record
This is a fixed monthly printout provided by the local phone company that details the fixed monthly billing charges.

Direct Inward Dial (DID)
A DID allows an outside caller to call an extension directly without going through an operator or automated attendant, without needing to have a dedicated trunk line for every extension.

Integrated Services Digital Network Basic Rate Interface (ISDN BRI) Line
An ISDN BRI provides for a maximum throughput of 144,000 bits per second over two B channels.

InterLATA
Calls from one calling region to another are referred to as interLATA calls. These calls will almost always be long-distance calls, but they may be in-state or interstate calls. (A LATA may occupy an area in more than one state.)
IntraLATA
An intraLATA call is one placed within the same LATA, or calling region. IntraLATA calls may be local or long-distance calls, depending on the local telephone company. It is best to check with the phone company before placing a call.

Local Access and Transport Area (LATA)
A LATA is a calling region that usually is defined by the local exchange carrier.

Local Exchange Carriers (LECs)
A LEC is a local telephone company that was in existence at the time of the breakup of AT&T; for example, the Baby Bells and GTE.

Primary Rate Interface (PRI)
A PRI is a form of T1 circuit that provisions for 23 voice-grade B channels and one D channel. The D channel carries most of the digital information such as direct inward dials and automatic number identification. In most hotels, PRIs are utilized to carry both inbound and outbound local traffic. In addition, they can be utilized to carry overflow long-distance traffic and international calls if their international rates are competitive.

Trunk Level 1 (T1)
A T1 provides for data transmission of up to 1.5 MB per second and usually consists of up to 24 voice-grade channels. In most larger hotels, T1s are used to carry intraLATA and long-distance services for a hotel.