

Four Trends Changing the IVR Landscape

Whitepaper

1	EXECUTIVE OVERVIEW.....	3
2	INTRODUCTION.....	3
3	SPEECH ENABLED IVRS.....	4
4	SIP TELEPHONY AND MEDIA GATEWAYS.....	5
5	SIP TELEPHONY AND MEDIA GATEWAYS.....	7
6	SUMMARY.....	8

1 Executive Overview

Four trends are reshaping the IVR landscape:

- Spoken word replacing button presses - a direct fallout of the ongoing trend from proprietary touch tone-based IVRs to VoiceXML-based IVRs
- The rise of SIP (Session Initiation Protocol) Telephony - more precisely, the rise of SIP-based VoIP (Voice over IP) telephony has given birth to pure software IVR platforms that run on standard servers (no expensive telephony cards required)
- Commoditization of Media Gateways - enabling the shift from TDM-based IVRs to Media Gateways coupled with SIP/VoIP software only IVRs
- Hosted solutions - the shift from on site enterprise IVRs to 3rd party service providers

2 Introduction

An IVR (interactive Voice Response) system has become the standard way most companies answer incoming calls, with an automated attendant switching calls to requested end points. Using IVRs supporting the VoiceXML and CCXML standards coupled with speech recognition engines, a caller simply asks for (by name or extension) his party and is connected - in contrast to pressing phone buttons after listening to a menu of choices. The result: better customer relations, faster service, and most importantly, better customer retention.

When first introduced, IVR solutions dramatically reduced personnel costs by using computer technology in place of dedicated operators with a PBX/switchboard, agents disseminating information or providing customer support. While this discipline achieved the desired cost reductions (from \$4.00 per operator assisted call to \$0.25 per automated transaction call), this savings derives from the tradeoff between people costs, hardware, real estate, infrastructure, telephony and support costs. These latter costs then become the target for the next reduction in costs.

The rise in VoIP (Voice over IP) telephony leads that attack. SIP (Session Initiation Protocol) has influence in two ways. Firstly, it enables SIP Trunking, where multiple VoIP calls arrive at an establishment over a data pipe, not a traditional ISDN PRI/BRI or T1 link. Secondly, it enables the rise in SIP-based IVRs that run on standard servers - no traditional telephony cards with their attendant restrictions on server capacity.

The key enabler is the Media Gateway, which maps calls between the worlds of ISDN or SS7 circuit-switched telephony, with the world of SIP/RTP packet-switched telephony. The vendors who previously brought you expensive telephony cards inserted in servers to create traditional TDM-based IVRs now provide a complete package - a Media Gateway. And these are increasingly a commodity.

SIP Trunking reduces telecom costs by eliminating the need for local PBX/CENTREX systems and costly ISDN BRIs or PRIs for smaller enterprises. With VoIP telephony, an IP-PBX running on a simple server is all that is required. For larger enterprises, Media Gateways and SIP IVRs running on standard servers, replace the investment in TDM-based IVRs. In either case, a Media Gateway at the SIP Trunk provider, or a Media Gateway on site, the enterprise's VoIP infrastructure is connected to the everyday world of PSTN.

But companies still challenged to contain and lower costs even more have yet another option. Today, a number of IVR and data hosting providers give businesses the alternative to outsource their IVR needs at even lower internal costs. They can outsource the creation of their voice applications; outsource the execution of their voice applications to external sites, or do both. Outsourcing makes absolute sense

when companies do not have in-house technical expertise to manage speech solutions and the routing and virtualization that accompanies such applications.

3 Speech Enabled IVRs

IVRs have historically been the “technology that annoys everyone” and are often accused of leading to lost and/or unhappy customers. Yes, IVR technology has aided companies by processing customer calls and inquiries more cost effectively than with employees, **but** at the sacrifice of customer satisfaction. We are all victims:

- “Press 1 for sales, press 2 for store hours, press 3 for directions, ...press 9 if you forgot the previous options”
- You spell your contact’s last name by pressing keys – and the IVR responds “there is no such match”
- The IVR gets “confused” with your request & locks up - you hang up in frustration
- There is no apparent option to opt out to an operator
- Then of course there is the *lightning response* (**NOT**) and interaction time of the system – just maddening!

Many companies still use prior generation proprietary IVR systems that use only telephone tones, where the user navigates through a hierarchy of fixed menus via button presses to finally get the requested information or the desired result. These systems are characterized by limited flexibility, features and performance.

The advent of the VoiceXML standards and IVRs that employ them, along with related standards (such as CCXML), allow one to create IVRs that can give the caller peace of mind by reducing the annoyance and frustration factor of computerized call handling.

VoiceXML was designed as a language to describe scenarios of human computer dialog. CCXML serves as a language to control how phone calls are placed, answered, transferred, conference ... CCXML works hand in hand with VoiceXML to provide a 100% standards solution for any voice application using telephony as access.

The VoiceXML standards support speech synthesis and speech recognition technologies, leading to significant feature enhancements and higher user acceptance. They allow for designing voice application systems that can more effectively and more efficiently serve the customer. Phone button presses are replaced by speech recognition where the computer “understands” and then directs the call and/or provides information. Imagine making an airline or rental car reservation via button presses alone. The clear benefit of speech recognition is reduced time making your reservation, and far greater user satisfaction. (Just imagine spelling out your destination city.) And on the IVR side, you have a greater ability to handle an increased call load.

Besides speech enablement, VoiceXML brings easy access to corporate data. This integration of voice and data generates a variety of expanded applications (beyond the chestnut of automated attendant/switchboard operation) benefiting businesses and users alike:

- Text to speech – converting data to be “read” over a phone device
- Speech to text – voicemail conversion to text, displayed on computer or smart-phone devices
- Automated information & reservation messaging already used by airlines today
- Emergency response and simultaneous multi-party communications resulting in accuracy & efficiency
- Automated Notifications – prescriptions ready, appointment reminders, airline cancellations notices

- Voice prompted schedules, weather, tourist information, airline ticketing, hotel & car reservations, bank balances
- Call routing based on spoken requests
- Predictive dialing for call centers
- Political campaign messaging (definitely a mixed blessing) and town hall meetings
- Survey studies

These applications and technologies bring automation and consequently time savings to call centers. Simple and repeated requests are handled automatically without human intervention taking automation rates in excess of 90% in most studied cases. Automated performance of any of the above application examples replaces the human element which has dramatic positive effect in reducing overhead costs.

With VoiceXML, one can design applications that conduct a dialog with the user and adapt the communication flow to the current situation. (The VoiceXML concept of mixed initiative). For example, if the caller does not tell the computer all the required information, the computer asks for the missing pieces of information. Reciprocally, the caller can tell the computer more information in a single step, reducing the overall time of the call and, more importantly, reduces user frustration.

The key ingredients to customer satisfaction are a well designed dialog interface with adequate capacity and performance in the IVR to execute the application.

Key to successful speech enabled IVRs:

- Compliance with industry standards (VoiceXML, CCXML) which equates to easy porting and rapid application development
- Voice recognition engines supported in a standards compliant manner (MRCP)
- Well designed dialogs for human/computer interaction, which lead to reduced time to complete a call compared with conventional IVRs
- Significant voice application performance (for example, our SPOT SIP Engine can handle 1,400 calls per server at 200 calls per second)

The bottom line is that the caller gets the personal attention and relationship that was lost with the original IVR deployment. The caller "profile" can be integrated with the voice application such that the computer recognizes the (for example) the caller purchasing habits, buying preferences, payment methods and the like, all leading to increased customer satisfaction and retained business. Simply put, "friendly interaction" with systems leads to 50% or greater caller acceptance levels

4 SIP Telephony and Media Gateways

In the past, IVRs were created either from:

- Special purpose hardware (the IVR manufacturer as hardware designer)
- Standard computers/servers that integrated telephony cards provided by 3rd party card manufacturers (the IVR manufacturer as system integrator)

In either case, the IVR manufacturer also had to provide:

- A software implementation of typical IVR functionality
- Interfaces to the telephony hardware (including adapting to constraints that hardware imposes: trunk capacity, signaling standards ...)
- A programmatic way of specifying the voice application (preferably by some scripting technique, but some manufacturers actual used computer languages)

The rise of SIP telephony, or more precisely, VoIP (Voice over Internet Protocol) using SIP signaling, has simplified life dramatically for IVR manufacturers. It allows for IVRs that only use SIP signaling, RTP voice

channels, and VoiceXML/CCXML Interpreters. In other words, we now have pure software IVR platforms that can run on standard PC servers without having any internally integrated telephony cards or any external switch to manage. No longer do manufacturers have to live with restrictions imposed by the telephony hardware. The IVR Vendor is now a software platform provider.

It's the same thing that is happening in the telephony infrastructure world; long haul backbones are being replaced by packet-switched networks; carrier infrastructures are migrating to IP oriented entities like Soft-Switches and 3GPP's IMS.

What makes SIP-based VoIP possible are two relatively new products:

- SIP trunks, where a service provider utilizes a data pipe (a connection to an ISP - Internet Service Provider - which may be the SIP Trunk provider itself)
- Media Gateways - a device which translates/maps the traditional telephony (ISDN, SS7) world with its 64 kbit circuit-switched audio channels to/from the packet-switched world of SIP signaling and RTP (Real-time Transport Protocol) used in the Internet world

In fact, most Media Gateway manufacturers are the same companies that previously made the telephony cards/external switches used by IVR manufacturers. In this new world, the IVR manufacturer focuses on the man/machine dialog, and the Media Gateway manufacturer focuses on the intricacies of interfacing to the world-wide traditional telephony infrastructure. This re-alignment is a win-win for both as each is focused on their area of expertise!

The implications from a total cost of ownership structure are many:

- An IP-PBX (which can be a SIP IVR providing an auto-attendant and voicemail function) is able to replace your on-premises PBX or CENTREX and interface with your SIP Trunk provider and SIP phones - no hardware other than a standard PC server.
- For a small business, a hosted IP-PBX provider can support a small number of SIP phones on your site, and route calls between your phones, providing voicemail and auto-attendant functions, using your existing Internet connection.
- If you have lots of telephony trunks coming to the enterprise, a Media Gateway can interface your existing external telephony infrastructure with an SIP-based IVR.
- Your SIP-based IVR runs on standard PC servers - easily scalable. No requirement for integration of new telephony cards as your needs expand.
- Without the cost of hardware driving costs for an IVR vendor, cost per port/channel will come down over time.
- With your voice applications on VoiceXML standards, you are no-longer locked into a particular vendor, and can port your applications to a new vendor relatively easily.

Netting it out, SIP telephony and Media Gateways are:

- Reducing/removing technology barriers
- Reducing on premises hardware needs
- Enabling services "in the cloud"
- Simplifying complications of integrating applications
- Enabling new services and increasing customer retention
- Allowing business to focus efforts on running their business, not their infrastructure

5 SIP Telephony and Media Gateways

Help yourself; consider outsourcing your IVR requirements and shifting to 3rd party service providers. If you prefer to keep your dialog design and integration with corporate data in house, doing your own VoiceXML applications, 3rd party collocation sites allows you to have real or virtual hardware, with adequate and often redundant IP access.

Outsourcing voice application development and/or using hosted IVR Service Providers yields:

- Increased flexibility - use and pay for just what you need
- Scalability, ramp up or down based on business activity
- Reliability, as hosted providers typically have redundant infrastructure
- Reduced overhead costs - eliminating the need for hardware infrastructure
- Reduced labor costs, by not having to acquire the application design and development resources to enable your application

Outsourcing also becomes a hedge against employee turnover with its loss of experience, or the need for re-sizing. A hosting company provides up-to-date architecture, with optimal performance and reporting - all designed to grow and shrink with the client's business needs. The best pricing model is based on usage (on-demand) vs. being fixed to a costing model based on potential growth.

In-house IVR services with space, personnel, architecture and software traditionally costs upwards of \$3,000 per line, independent of labor and maintenance costs. Hosting companies provide full compliant and encrypted services for as little as \$500 per month on a usage basis. This should be considered by any company looking to reduce capital and labor costs. A Frost/Sullivan TCO report concluded that in both a three and five year basis (for 100 seats), the savings from hosted services (full function) is 42% (3 yr) and 23% (5 yr). The findings imply that as the size of a contact center organization grows, a company has greater cost savings to realize with a hosted model.

Net: Hosting/outsourcing provides alternatives in several ways:

- Moving applications into the cloud could impact cost savings even further.
- You can acquire a complete IVR solution, which can then be hosted at a collocation site, at a 3rd party service provider site, or at your own site.
- You can design and implement your own IVR application, and then host it as above. Your design and development can occur on a test portal provided by your intended hosted service provider, or on a test/demo system installed at your site or on a hosting provider's site.
- You can simply buy an IVR service from a provider that designs to your requirements and executes your application in their own hosted environment. Here you are trading "I need a job done" for being locked into a specific vendor.

6 Summary

VoiceXML and CCXML technologies have changed the traditional thinking of automated telephony and voice systems, bringing standardization flexibility, and interoperability to telecommunication and networks. Because of the integration of text-to-speech, speech-to-text and web enabled functionality, IVRs are evolving to serve much broader applications and markets. At the same time, NG (next generation) IVRs are driving costs and infrastructure dramatically lower; a win-win for developers and users alike.

Speech processing software (ASR/TTS) provides the option for user input with high recognition accuracy – 95% range and quality speech output gives a human-like interaction.

IVR manufacturers that are compliant with the VoiceXML and CCXML standards bring the additional benefits of industry standards: ease of porting applications, a cadre of trained application programming specialists, protection from reliance on a single vendor, and in time, availability of “off the shelf” voice applications.

The evolution and value don't stop here. By the end of 2013 (according to T3i Group) 95% of all IVR systems shipped support VoiceXML and 90% of those will use SIP-based VoIP telephony, both of which add features while lowering costs. This is further proof that the use of VoiceXML and CCXML when paired with SIP standards in automated telephone and voice applications is the correct choice for the future.

Interact's SPOT SIP Engine exploits these four trends:

- It is “state-of-the-standards” - compliant with VoiceXML 2.0, 2.1, CCXML 1.0, MRCP V2, SIPConnect 1.0, so all of the benefits of open standards, and all the new voice and data functionality VoiceXML brings are available, and with your choice of speech engine for ASR/TTS. And compliance means you can migrate existing applications to a SPOT solution.
- It is a pure VoIP software platform, runs on standard PC Servers on Linux, uses SIP signaling, so that it's independent of constraints imposed by telephony cards, and, in fact, can run as many as 1400 ports/channels on a single server.
- With SIP signaling, it can function as an IVR behind a Media Gateway that interfaces with the traditional PSTN world, or interface with SIP Trunk providers directly. Its SIP signaling stack interfaces directly with its CCXML Interpreter, enabling all the switching, bridging and conferencing capability envisaged in the CCXML standard.
- It readily fits into hosted environments, needing only a real or virtual server running Linux, it installs using RPMs. Once installed, it is managed by browser-based tools from anywhere that has access - no Linux skills required. That, and a rich application development tool set allows enterprises, VARs, collocation providers, hosted services providers, (and of course Interact), to provide for hosted development and/or hosted voice application execution.

Beyond these trends, the SPOT SIP Engine provides some additional capabilities:

- Performance - we believe SPOT performance is much better than any other competing architecture. It is capable of running up to 1400 channels on a single 8 core server, with 200 calls-per-second in a couple of high-stress voice applications. The benefits from performance are:
 - Better user experience
 - Minimal infrastructure and employee costs for a given application load
 - Lower comparative TCO (total cost of ownership)
- Failover redundancy - SPOT supports a Worker/Standby model (actually a N+1 redundancy model), with application support for recovery of all active calls in the case of a server fail over. And there is no need for the Standby server to be at the same site as the Worker (or Workers). Again, the benefits are:

- Better user experience, with a standby server picking up and continuing dialogs for calls in progress
- Maintaining business critical applications from failing and losing established calls when servers fail

About Interact Inc., Software Systems

Interact has been in the IVR industry with proprietary, VoiceXML-based, and now fully compliant VoiceXML solutions for about 30 years.

Interact custom IVR applications integrate new and advanced technology to provide customized applications helping to streamline operations for virtually any industry. Our services are designed to help global partners reduce communications and hardware costs. Our goal is to provide a one-stop solution for IVR, SMS, geo-location, ASR, VoiceXML, CCXML, SIP, web integration and other advanced features, integrating them all together. Our solutions can be deployed as standalone, integrated into existing infrastructures and/or hosted in any number of centers around the United States.

Regardless of whether you are an Enterprise, Voice Application developer, Integrator, VAR or Hosting Solutions Provider, Interact has the right voice application engine, tools and support for you. At the end of the day, Interact is here to provide you more value, reduce your costs and to “future-proof” your investment. We welcome the opportunity to serve your IVR needs.

For more information and technical detail refer to www.iivip.com/solutions/spot-sip-engine/ where you can find a SPOT SIP Engine Product Brief or a Performance White Paper. You can register there to use our SPOT Test Portal, where you can test out the SPOT SIP Engine on your application, or register for a software download of the SPOT SIP Engine itself.

We are always available for a personal consultation by calling 512.502.9969 X130 or DID: 512.501.2685.

