

The Next Big Opportunity on the Web

An Introduction to Voice Portals

The voice portal market is exploding with enormous opportunities for service providers to grow business and revenues. Voice-based Internet access uses rapidly advancing speech recognition technology to give users anytime, anywhere access to Web-based information. And it uses that most universal form of communication and access: The human voice over an office, cellular or home phone.

The potential of voice portals is as big as the reach of the telephone, which today number 1.3 billion around the world. Compare that to the 250 million computers with Internet access and it is easy to understand why analysts believe voice-enabled Web access will take off. Frost & Sullivan* estimates a 54% growth rate for the voice portal market segment over the next six years. The Kelsey Group* predicts \$5 billion in voice portal service revenues by 2005, including advertising, subscriber bounties, and location-specific commerce, with an additional \$7 billion incremental revenue to infrastructure providers that serve those companies. By 2005, they predict, 45 million users of wireless phones in North America will regularly use voice portals to perform "their everyday cyberchores."

Enabling Services for the Next Generation Network

The Next Generation Network (NGN) is poised to make business communications systems dramatically more efficient, convenient, and cost-effective.

Who is getting on the voice portal bandwagon? For competitive service providers, voice-enabled Web access is a way to immediately carve out a new space in the crowded Internet market. For existing Internet portals and providers, speech-enabled Web access adds differentiation and value to existing offerings. Voice portals are, in fact, the next frontier in convergence, the intersection of the Internet and telecommunications, blurring the distinctions among voice and data, computers and telephones. And, like any frontier, the rewards for establishing your claim early and successfully are great.

This article describes the business and technology factors that are making voice portals the next big opportunity on the Web, as well as the various approaches that service

providers and developers of voice portal solutions can follow to maximize this exciting new market opportunity.

Why Now?

When Alexander Graham Bell said, "Watson, come here I need you," instead of, "Watson, what time is it?" he unwittingly set a precedent for the telephone as a communications medium. Over the next century and more, the promise of information services over the telephone was always there (Directory Assistance, Weather, Time), but that potential was never fully realized.

There were several reasons. For one thing, the telephone keypad can provide only a limited number of choices to a user. Furthermore, there is no easy way to navigate from one question or source of information to another on a phone, except to go back to a beginning menu.¹

In addition, the Internet business advertising models of content delivery had yet to emerge. Most telephone-based information providers charge users a fee for sports scores or even weather, but there are limits to what consumers will pay for information. The public appetite had yet to be whetted by the Internet's promise of information anywhere at any time. People did not know what they were missing.

With deregulation of the telecommunications industry, a new class of service providers has emerged: competitive service providers who need to differentiate themselves in a fiercely competitive market. Voice portal services are relatively straightforward to deploy and offer many opportunities to carve out a singular niche in the market. Voice offers service providers an incredible opportunity to expand their user base and differentiate themselves from their competition. At the same time, existing portal and Web site operators have huge databases and can support telephone applications with minimal investment. And the business models that drive the success of the Web - advertising driven, rather than fee driven - can easily be adapted to Internet access via the telephone.

Also, technology has evolved, with speech recognition technology in particular making dramatic advances, powered in large measure by huge increases in processing power. Text-to-speech (TTS technology) has also improved. The adoption of a standard voice scripting language, like VoiceXML*, can be expected to fuel voice portal services, just as HTML fueled development of the Internet.

At the same time, the cost of creating a speech-based portal platform continues to decline. Increasing densities and decreasing costs on the voice processing and network interface hardware that form a central part of a voice portal system allow service providers to serve more users at less cost.

Finally, the Internet has raised public expectations, with people growing used to having information at their fingertips when they want it. Once people get accustomed to immediate news, weather reports, movie listings or stock quotes over the Internet, the transition to the phone makes perfect sense. And for those without computers, the telephone is a natural way to cross the "digital divide" into a new world of information access that they had been barred from in the past. In fact, the number of persons with access to telephones is estimated to reach 4.9 billion worldwide by 2004, while the number of persons with access to the Internet is estimated at 800 million. (Source: a Telsurf Networks* whitepaper) And as usage of cell phones increases, people expect instant access to information even when they are away from their homes or offices.

It all adds up to a new kind of convergence. The Internet was designed as an information medium, but it is rapidly becoming a communications medium. The telephone was designed as a communications medium, but is being transformed into an information medium with the emergence of voice portals. And, in a digital world, communications and information are converging into a stream of digits that can be readily accessed by a multitude of devices, when and where people want.

What Is a "Voice Portal?"

In its most generic sense a voice portal can be defined as "speech-enabled access to web-based information." In other words, a voice portal provides telephone users with a natural language interface to access and retrieve web content. An Internet browser can provide Web access from a computer, but not from a telephone. A voice portal is a way to do that. Of course, simple access and retrieval of information is just the beginning. A voice portal can also be used to provide users access to virtual personal assistants and Web-based unified messaging applications.

A voice portal service provides access through the phone to such information as news, weather, traffic, stock quotes, driving directions, or restaurant guides. In some cases, these are Internet-based services in an audio format. Some are supported by advertising; others may also offer premium services for a fee.

A voice portal can also provide a front-end for Web messaging, a new breed of unified messaging that integrates Web access with more traditional technologies like voice mail, email and fax. Users can access their mail through the telephone or the Web.

Going one step further, a voice portal can also be used to access a virtual personal assistant. The first generation of these services was introduced a number of years ago by companies like Webley* or General Magic*. Users get a single phone number for all incoming calls, with a "virtual assistant" that either locates the user at one of the several phone numbers (cell, home, office), or takes a message. The personal assistant can also place phone calls for the user, interrupt phone calls with call control options, and provide similar phone-oriented administrative functions.

There are also many business applications for voice portal technology. Voice portal technology has the potential to dramatically improve customer satisfaction, increase revenues and reduce agent costs when used in e-Business. Enterprises such as major airlines, financial services companies, and overnight delivery companies are adopting public-network-hosted speech recognition technology to provide customers with such services as travel information and reservations, order entry and tracking, as well as stock trading. These voice services will be either directly accessible or through links to a voice portal service.

Who Provides Voice Portals?

The voice portal industry is still emerging, with business plans changing fast and the prospect of mergers and shake-ups ahead. Today, voice portal services are typically provided by:

Start-up Voice Portal Companies: These are companies whose basic business is building, hosting, and marketing voice portal services targeted to particular audiences. Examples are TelSurf Networks* and HeyAnita*. Each of these voice portals directly provides a different mix of information services to businesses and consumers. HeyAnita and TelSurf Networks, which debuted in the fall of 2000, will also read email to their users.

Web Portals: A second kind of provider is a traditional Internet portal that wants to extend its reach via the phone. For example, Lycos* struck an agreement with Quack.com* to allow people to access Lycos over the telephone. Quack's Chief Executive was quoted as saying, "We're not going to build a portal by ourselves. Lycos is our portal" (CNET.com 5/23/00). Similarly, America Online* took a \$5 million stake in

Speechworks International*, with AOL licensing SpeechWorks technology to enable it to "develop voice portals to its online services" (Wall Street Journal July 6, 2000).

The advantages of voice enabling a Web portal are easy to understand, as Kathy Kinney, MapQuest* Director of Business Development told the Wall Street Journal*: "As a dot-com, our reach was limited to those who got to the Internet through some type of techie device. We looked at the phone service and said `Holy cow, this is the way we can reach the neighbor across the street through the phone in her kitchen that she's been using all her life'" (Wall Street Journal, June 20, 2000)

Network Service Providers: There is a third major category of voice portal service providers. It consists of telecommunications or Internet Service providers who want to drive an increase in customer loyalty and maximize network usage with branded portal services that they host in the network and/or obtain from third-party suppliers. For example, Talk2.com* is partnering with wireless companies that want to add value to their packages.

Telera*, Netbytel*, and Price Interactive* are examples of hosting service providers that allow ISPs and start-up voice portal companies to extend enhanced services using voice without having to build and maintain the technology infrastructure. The ISP does not need to be an expert in a particular technology or application, such as speech recognition or telecommunications, but instead concentrates on launching new services and growing their business. These hosting service providers are all based on Intel® technology that allows them to scale and change to an ISP's growing needs. In short, the ISP can select the "best in breed" application that fits their business model and can stay focused on gaining and retaining customers, not on maintaining technology.

A Closer Look at Some Technology Trends and Their Providers

Several technology trends are speeding the emergence of voice portals. Most significant is speech technology, which has been growing very rapidly. Most analysts project a continuous growth rate of 31 percent per year from 1999 to 2004.

*** Speech Recognition Software**

Automatic Speech Recognition is rapidly entering the mainstream. Earlier speech applications recognized only a small vocabulary of 20 to 30 words, but the accuracy and vocabulary size of Automatic Speech Recognition engines has dramatically improved, fueled by refined algorithms, dramatic increases in processing power, and lower costs.

Today's speech systems support naturally spoken phrases and do not require prior training.

Some major vendors of speech recognition software include IBM*, Nuance*, Philips Electronics NV* and Speechworks* International. In the United States, Nuance and Speechworks have a major share of the market with support of multiple languages.

* Continuous Speech Processing (CSP)

CSP is designed to optimize the performance of host-based speech resources by streaming preprocessed voice data between Intel® Dialogic® telephony boards (analog, T-1, E-1) and a host computer's central processing unit (CPU). CSP also enhances existing speech technologies with additional algorithms that enable the creation of large-scale systems that include thousands of lines of speech recognition.

Continuous Speech Processing (CSP) is a breakthrough in support for large-vocabulary, host-based speech recognition. Introduced by Intel, CSP technology allows developers to build speech recognition applications, including voice portals, more cost-effectively.

CSP incorporates new algorithms that support features such as barge-in, which allows a user to interrupt speech prompts by speaking over them. A speech recognizer is able to understand what is spoken during the interruption.

By integrating CSP on its voice processing platforms, this CPU-intensive function is off-loaded from the host system CPU to a board-based DSP that effectively manages the speech energy detection. This reduces the host-based workload without requiring additional hardware. The enhanced technology also enables applications to recognize voice commands more accurately, making them easier to use and increasing customer satisfaction.

* Text-to-speech

Once information is accessed, it needs to be communicated to the user. One way to do this is via text-to-speech, or TTS. TTS is increasingly being used to speak email and Web-based text to callers and will play a wider role in the future. Real-world applications, such as email, read over the phone, are made possible by preprocessors that handle "dirty" data such as acronyms, contractions and differences in intonation, Lernout & Hauspie* is one of the principal TTS vendors with support for multiple languages.

* VoiceXML*

Just as growth of the World Wide Web was catalyzed by the development of the HTML scripting standard, the acceptance of a universal standard for voice-based services can be expected to propel growth of these services.

VoiceXML is the major standards effort for voice-based services. VoiceXML (Voice eXtensible Markup Language) will allow providers to open up Web services to customers using voice interfaces. It will handle synthesized speech for Text-to-speech recognition of spoken input, recognition of dual-tone multi-frequency (DTMF), recording of spoken input, and telephony call control. Enterprises can build automated voice services using the same technology they use to create visual Web sites, significantly reducing the cost of construction and delivery of new capabilities to telephone customers. Because established Web technologies are used, the integration with back-end databases can be shared with the HML application.

VoiceXML, which began at AT&T Bell Laboratories*, brings together Lucent* and AT&T* Markup languages with IBM's SpeechML* and Motorola's VoxML*.

Most major players in the development of speech-based players are members of the VoiceXML Forum*.

* New Testing Tools

The success of speech-based applications depends on such factors as the phrasing of voice prompts as well as on other behavioral factors. So it is important to be able to easily encapsulate lessons learned into new applications.

Speech technology providers have created powerful tools to ease rapid deployment. One such tool is a high-level applet that contains much of the knowledge gained from an application's dialog design and implementation of frequently used caller interactions. These can reduce the time it takes to build a new application from 30 person years to months or even weeks.

Service Provider Options: Build, Buy or Host

Developing a voice portal solution is more complex than just putting the pieces together. Service providers need to focus on their business: customer acquisition and branding, not on technology. Time-to-market is everything, and getting to market quickly requires working with an experienced partner who understands both the technology and the requirements of competitive service providers. And, needs change very quickly. Service providers and developers look toward suppliers who are flexible and offer a choice of open, standards-based building blocks. This provides maximum flexibility.

Another factor often overlooked is the importance of support, training and consulting services. These services, which allow faster development and deployment of voice portal services, are an integral part of a whole product/service offering. Although many vendors say they offer consulting services, it's important to evaluate just how robust these services are before choosing a partner.

Service providers have three major options for deploying a voice portal solution:

1. Build and deploy the solution themselves
2. Purchase a system from a solutions provider
3. Have their service hosted

No matter which path they take, the following criteria are important to consider when considering a system and vendor:

- * Does the solution consist of components built to open standards?
- * Is it scalable?
- * Is there a clear and definable growth path?
- * Is there adequate flexibility in the platform to add/modify service offerings?
- * Does the vendor provide adequate support?
- * Is training available?
- * How robust are the consulting services offered by the vendor for system planning, design and deployment?

Build It

Today, many service providers choose to buy all of the components of a voice portal solution (including voice boards, network interface, software development tools, applications platforms and the necessary computing hardware) and build it themselves.

One option is to purchase the hardware components separately, integrate the platform and develop the application. Alternatively, they might choose to take advantage of a new level of building block -- a fully integrated "application-ready platform". This is a pre-configured server platform that contains all the necessary voice hardware on which they can base their service.

In either of these situations, training and the professional services will help them put the solution together more quickly and easily, and without the need to retain specialized developmental resources in-house.

Building solutions can be advantageous for the service provider, since it provides ultimate control of cost models and configuration flexibility. The service provider can negotiate best price for components based on volume and control all the options in the delivered solution. Many times, this approach is necessary to meet the requirements of a diverse customer base.

However, building your own solution can also have drawbacks. Fundamentally, the challenge of integrating these components is not for everyone. The cost of acquiring the integration expertise and maintaining that talent across customer segments is significant, especially when it is not part of the core business.

Buy a Solution

Since building a solution is not for everyone, there are many choices available to the service provider who wants to focus on the delivery and leave the integration to someone else. As the market for voice portals matures, service providers will be able to choose among a variety of voice portal developers who already provide leading edge applications. Examples include: Web access, unified messaging, or virtual private assistants.

When evaluating sources for a complete solution, service providers should look for vendors that can provide all of the components stated above (voice boards, network interface, software development tools, applications platforms), plus the required computing hardware bundled in a single solution. By doing this, the voice portal solution can be readily packaged, branded and distributed in large quantity. In addition, individual hardware components can be optimized for a specific configuration, providing reliability and bulletproof operation. The applications that reside on such tightly integrated platforms can be turnkey products or tool kits that provide a ready means for making modifications.

Hosting

On the data side, the Internet has evolved to a model where space, hardware, and event content can be hosted by one or more third parties. The voice portal market is moving in the same direction.

A fully managed hosting solution provides the advantages of a bandwidth-rich environment that is built and monitored to ensure mission-critical reliability. Service

providers can deploy solutions almost immediately. They do not have to manage any hardware or bandwidth. Instead of focusing on the technology, service providers can focus on their business. In addition, to dramatically decreasing time-to-market, outsourcing offers scale and expertise, while allowing providers of voice portal services to concentrate on their business rather than on technology.

Current Industry and Offerings are Perplexing. Where Can You Go First?

As one of the major forces in the world of converged communications, Intel can help you succeed in this fast-moving, highly competitive market. Intel offers a complete set of open, standards-based building blocks, server platforms, telephony interfaces, support and consulting services, as well as a third-party network of voice portal developers to help you get up and running fast. We offer a variety of platforms for maximum choice and flexibility -- all highly scalable, flexible and always open.

Intel has been working to enable competitive service providers for over 15 years and has developed a solid understanding of the problems and challenges they face. Whether you build your own voice portal solution using our open, standards-based building blocks, purchase a system, or have your service hosted, Intel can steer you toward solutions and companies that are right for your business and that will help you maximize your opportunity in this exploding market.

Intel has a proven history of helping companies make the most of revenue opportunities available for supplying global communications services in today's growing business markets. It is a recognized pioneer and industry leader in the manufacture of open hardware and software products for voice, fax, Internet telephony, data, voice recognition, speech synthesis, network interface and call center management that are the building blocks in many of the leading communications solutions on the market today.

As the rate of business and communications networking accelerates, you can rely on Intel to be the forward-thinking communications solutions trailblazer who can help you navigate through these changes successfully.

Footnote: (1. In the wireless arena, this problem is being partially addressed by the development of a standard, lightweight browser and application protocol for phones using technologies like wireless application protocol (WAP). This, however, can still be a cumbersome interface when doing other tasks, such as driving.)

At Intel, we're ready to work with you.