

# Voice-enabled e-Business

*Unlocking e-Business Opportunities*



intel®

## **It's a Revolution. The Opportunities are Endless. Are You Ready?**

All business is becoming e-Business. In fact, worldwide e-Business revenues will reach US\$1.3 trillion by 2003.<sup>1</sup> But for service providers, truly getting the most from today's enormous e-Business opportunity takes a *v-Business*. Voice-enabled e-Business — *v-Business* — gives customers easy voice access from any of the one billion phones in use around the world. It's the ultimate way to attract new subscribers and keep existing ones, raising your revenues to new heights. And if your e-Business isn't already becoming a v-Business, your competitor's probably is.

Today, competitive service providers have the opportunity to differentiate themselves in the marketplace with compelling new voice-based Internet services like voice portals for anytime, anywhere access to Internet content from the telephone. Internet-based, voice-enabled unified messaging and personal assistant services provide the same easy access to voice, fax, and email messages. Internet gateways enable virtually free long distance calling. On the business side, service providers are growing their revenues by hosting powerful voice applications like contact centers and unified messaging integrated with the Internet.

Users want these dynamic new services now. And they want to access them using any phone — wireless or wireline — and hands-free voice commands. Success as a service provider means being first to bring these services to market. They're what will differentiate you in the marketplace and build your market segment share. They're what will grow your profits today and tomorrow. And that's what it's all about. The only question is, are you ready?

Whether you choose to host, buy, or build next-generation, Internet-enabled voice services, Intel can help you with your winning v-Business strategy. The most competitive voice services are built with sophisticated, open technologies. And with more than 15 years of experience and three million installed ports, Intel, with its Dialogic® brand product line, delivers the industry's most powerful combination of next-generation, standards-based building blocks and technologies — plus rock-solid support.

***Voice-driven  
e-Business could  
reach US\$450 billion  
in revenue by 2003  
— three times the  
projected revenue  
for online retail.***

***(Source: Forrester)***

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<sup>1</sup>IDC Internet Commerce Market Model, July 1999

## Complex New Challenges for Service Providers

Today's service providers face a competitive environment that's dramatically different — and much more complex — than ever before. The basics are still the same: how to build revenue by offering services that attract new customers, how to keep revenue by retaining customers, how to maximize profits. But the challenges are new. You've got to do it all and still be flexible enough to change at Internet speed, keeping things simple and convenient for customers.

Deregulation of the public network has completely changed the service provider landscape. Key technologies are making major strides: Internet Protocol (IP) telephony, wireless Internet, speech-driven user interfaces. New and essentially free services — like Internet voice and unified messaging — are quickly reaching the marketplace.

At the center of all these changes — and the new opportunities they bring — is the converged communications network, a packet network that brings together voice and data based on open, standards-based building blocks from Intel.

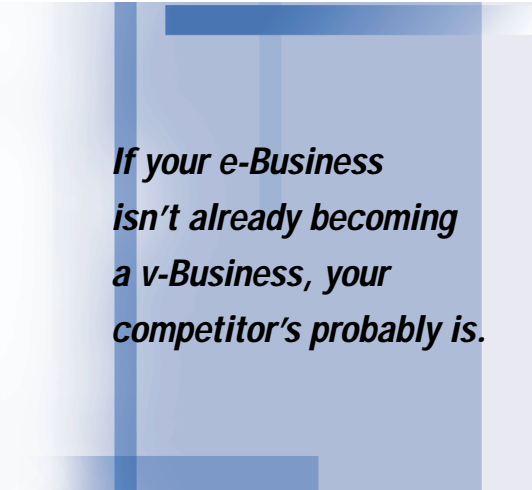
## The Time is Now

The complex new challenges facing today's service providers have grown out of changes in the public network and the backbone communications infrastructure.

New standards like Parlay, VoiceXML, and Wireless Applications Protocol (WAP) are redefining — and opening up — the service provider's environment. The entire network architecture is evolving into an open infrastructure based on standard components, protocols, and programming interfaces.

In this open environment, successful service and equipment providers will base their infrastructure on standards-based building block components with open protocols and programming interfaces. Free from infrastructure worries, they'll be able to focus on quickly deploying the value-added services that make them stand out in the marketplace.

At the same time the communications infrastructure is changing, packet-based communications networks are displacing traditional voice networks with the promise of lower operating costs and essentially free bandwidth. The converged networks are embracing the same devices we already use — letting you make a call from your desktop PC, browse the Internet on your mobile phone, and play voice messages on your wireless hand-held PC.



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isn't already becoming  
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And of course there's the Internet, which has changed everything. Today we expect anywhere, anytime access to the ocean of information available on the Internet. As the Internet evolves into an increasingly powerful communications medium, we'll continue to expect an open, available network. Voice communications have become the new Internet standard. Speech technology is essential to powerful new services like voice portals. So is the need to connect to the Internet over one billion voice-based wireless and wireline handsets.

In short, the old vertically integrated, proprietary infrastructure is dying. In its place is emerging a new open ecosystem built on open, standards-based building blocks.

# The Open Network

The converged voice and data network will be an open packet network based on standard protocols and application interfaces. For service providers, this means more choices, greater flexibility, and new opportunities.

The goal is to remake the voice network in the image of the Internet. With its open nature and low entry barriers, the Internet has created an entirely new ecosystem. This redefined value network gives us a window into the future of the new, open communications network.

One profound development has been the open Internet server, offering millions of browser-enabled PCs access to advanced applications and the Internet's vast content. As part of recreating the voice network, the open softswitch — which provides software-based switching services — will deliver on the same promise of enabling the billion wireline and wireless phones. For users, the result will be easy voice access to Internet content and a rich environment of voice services.

Advances in technologies like Voice over IP (VOIP) have made the promise of the converged network real. The industry is well down the road toward defining the architecture for an open network. Several alternatives have been defined, all sharing the same underlying concepts. The basic idea? Decouple the hardware from the services and application software.

The next step is defining how the elements of the network will interact. What makes communication and control of these devices possible is an open set of standards-based protocols and application programming interfaces (APIs).

## Industry Standards

Getting the application community to converge on one API is no simple task. But momentum is beginning to emerge for a single model that supports the goal of a "golden" telecom API. The Internet achieved this model with Internet servers. The converged communication server and the softswitch hold the same promise for the telecom server. Here are some of today's key telecom standards and standards bodies.

### Protocols

- ▶ H.323 — the International Telecommunications Union standard for transferring real-time voice and video
- ▶ IP — Internet Protocol
- ▶ MGCP — Media Gateway Control Protocol
- ▶ S.100 — A software voice processing standard established by the ECTF
- ▶ SIP — Simple Internet Protocol

### APIs

- ▶ JAIN — JAVA API for Integrated Networks
- ▶ TAPI — Microsoft's\* Telephony Application Programming Interface
- ▶ VxML — Voice eXtensible Markup Language

### Organizations

- ▶ ECTF — Enterprise Computer Telephony Forum
- ▶ IETF — Internet Engineering Task Force
- ▶ ITU — International Telecommunications Union

The key to it all is one compelling idea: basing solutions on open, standards-based hardware and software. With 250 million computers in use by 2003, the Internet server gives all these devices a standard way to access an ocean of content. Similarly, the open computer telephony (CT) server will enable the 1.3 billion wireless and wireline devices<sup>2</sup> in use — all of which will need the same connectivity.

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<sup>2</sup>Strategic news service

## Change Brings New Opportunities

The structure of the communications industry is dramatically changing — and these changes are having a profound impact on service providers.

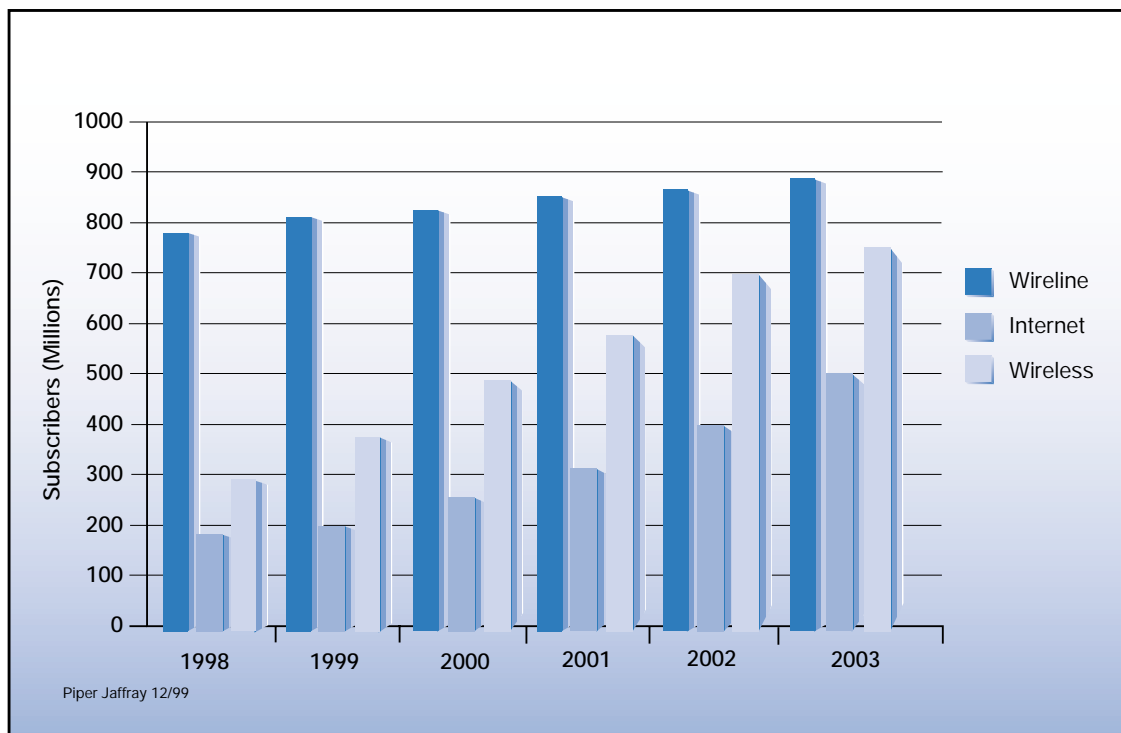
In one respect, we're seeing a major consolidation. Industry analysts predict there will soon be only between five and eight global, all-purpose service providers.

At the same time, the rest of the industry is fragmenting. Why? The liberalized regulatory climate and new open, standards-based hardware and software solutions have lowered entry barriers, creating the right environment.

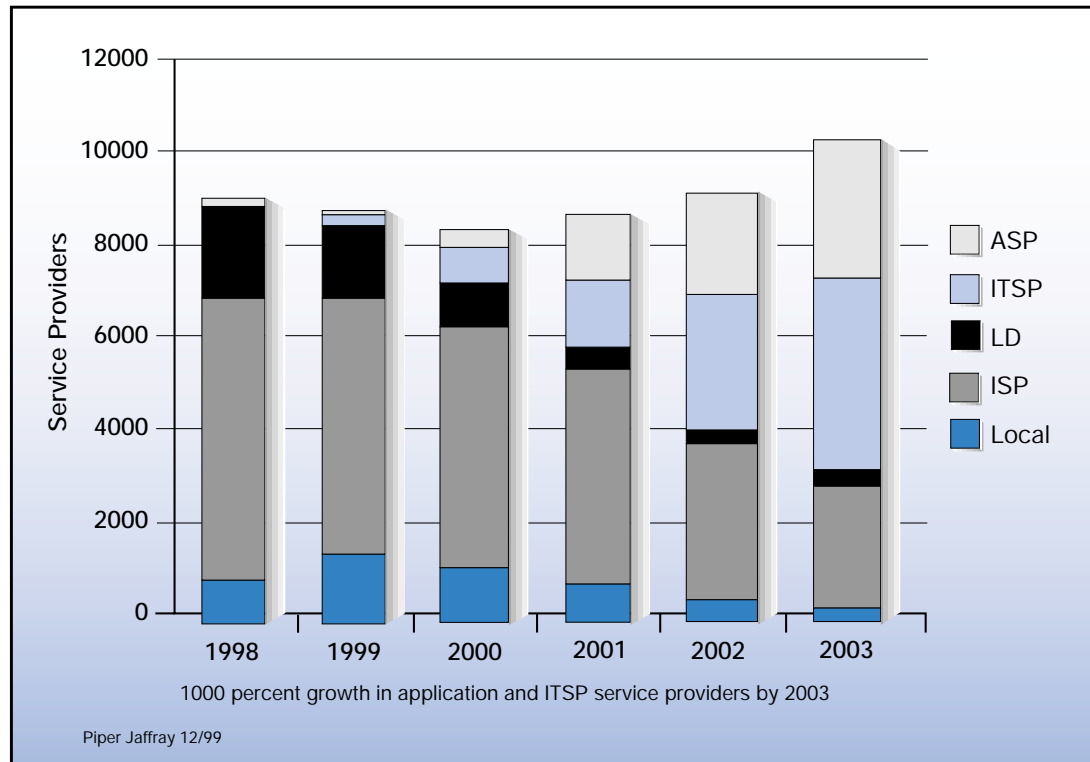
On the customer side, the change is being driven by the tremendous growth of e-Business. Add voice into the mix and Forrester research estimates that v-Business could reach US\$450 billion in revenue by 2003 — three times the projected revenue for online retail.

This environment presents many opportunities for new voice-enabled products and services. Key technology developments like higher fiber bandwidth and more powerful processors are enabling this to happen.

### Interactively Connecting People



## Creating Open Network Focus on Application



## Technology Drives the Change

Technology improvements are the engine for the new e-Business/v-Business economy.

Fiber bandwidth has improved by 30 times to 100 gigabits per second for a single fiber. The U.S. has close to one million miles of fiber laid. All of which means that today it's possible to make up to 10 million voice calls simultaneously.

At the same time, computing power has dramatically improved. Silicon density is up by 20 times over just a few years ago, with 1 GHz Pentium® processors on the market. Today a single Pentium processor can handle one million Class 5 calls during peak usage hours.

Open, standard software solutions on the Internet server model also play a role, with e-Business being enabled by new Internet and database servers and v-Business enabled by softswitches and converged communications servers.

A softswitch does three things.

1. Integrates the Internet telephony and circuit-switched worlds
2. Duplicates Class 4 and 5 switch capabilities in a next generation network architecture
3. Decouples call control from the media flow for a more scalable and open application environment

As the softswitch continues to evolve, the ability to incorporate features like directory services will become increasingly important. You'll be able to place a call by simply looking up a name in a directory service database, bypassing the human operator. Accessing the directory and dialing the number using spoken commands will make it even more convenient. And these are only simple examples.

The open covered communications server works like a PC or database server. Telephony developers can quickly and easily build powerful business communications platforms over an open, standards-based server platform. End users can choose best-of-breed communications applications and technologies from leading vendors and run them on a single system that shares the underlying hardware. Integrating standards-based communications applications onto a single server simplifies development and lets developers build scalable products, cut hardware costs, and significantly reduce their time to market. Numerous Intel customers are developing interoperable converged communications server applications like telephony switching, Internet-enabled contact center, unified messaging, and interactive media response.

## Redefining the Architecture

At the core of any network is the fiber and switching infrastructure that makes it work. Traditional service providers were the ones who owned this infrastructure. But the deregulated voice environment opened the door for organizations not tied to this infrastructure to offer services to businesses and consumers. This trend — plus the transformation of networks from circuit to packet-switch architecture and the availability of cost-effective service platforms based on open components — let these new service providers build a business case for their services.

Today a variety of equipment providers tout next-generation switching and service platforms — effective replacements for yesterday's massive switches and advanced service platforms. These next-generation platforms are low in cost, flexible, and the basis for converged communications applications.

Some would call this a revolution. While this is true, the "revolution" actually began more than a decade ago when companies like Intel introduced open communication building blocks on which developers could build a wide variety of switching and service platforms. This fostered an entirely new ecosystem — a value network — that made it possible to deliver cost-effective solutions for high-value, differentiating services like least-cost routing, prepaid calling card, and advanced messaging. Hundreds of new service providers were able to take advantage of solutions based on these building blocks. The revolution had begun.

***The market for communications services alone is expected to reach almost US\$8 billion by 2003.***

***(Source: U.S. Bancorp Piper Jaffray)***

Some service providers offered their services directly to businesses and consumers. Others offered their services to other carriers. Traditionally known as service bureaus, these were actually the first voice application service providers (ASPs). The market for communications services alone is expected to reach almost US\$8 billion by 2003 (Source: U.S. Bancorp Piper Jaffray).

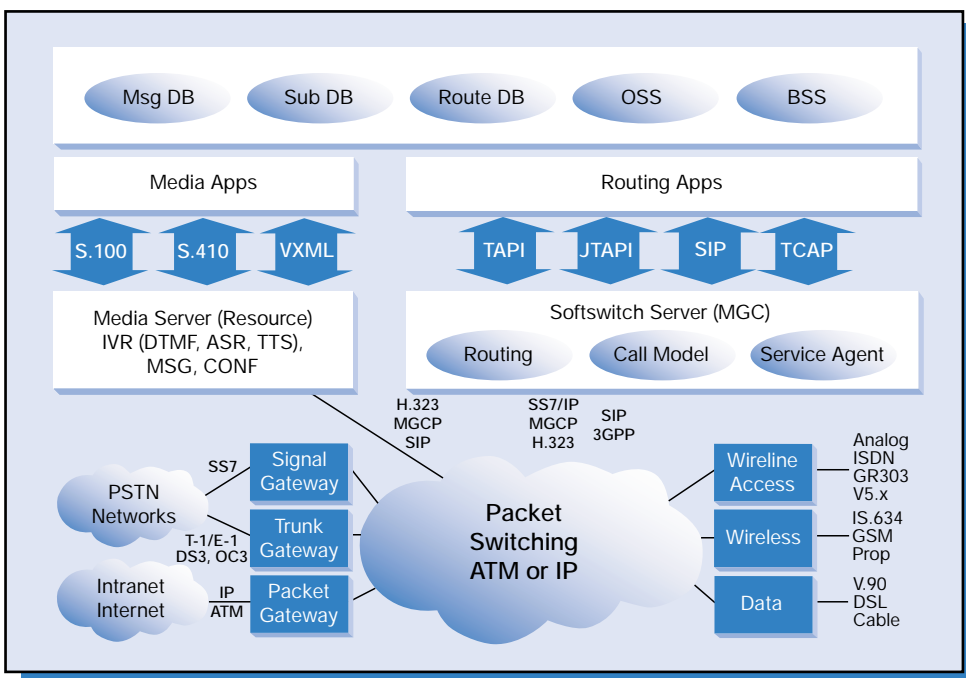
## Intelligence Moves to the Edge

Long distance minutes continue to become a commodity. Service providers continue their quest for higher value, differentiating services to help them improve customer satisfaction and attract new customers. The new generation of service providers will rely on third-party carriers for bandwidth, but also on hosting service providers for Internet and voice server infrastructure. Their focus will be on establishing a local presence (in other words, an edge network) and implementing applications that control network functionality from the edge. At the edge network points-of-presence (POPs) will be converged communication servers — effectively, edge switches with advanced functionality like speech recognition.

Solutions are becoming more software-centric. The trend toward outsourcing continues. And value-added services will continue moving toward the edge of the network, making the industry flat and providing an opportunity for many service providers to enter the game. They will focus on the application and the customer, leaving management of the infrastructure to others.

***The new generation of service providers will focus their resources on establishing a local presence, relying on third-party carriers for bandwidth and on hosting service providers for infrastructure.***

## Next-generation Application Architecture





## The New Service Provider

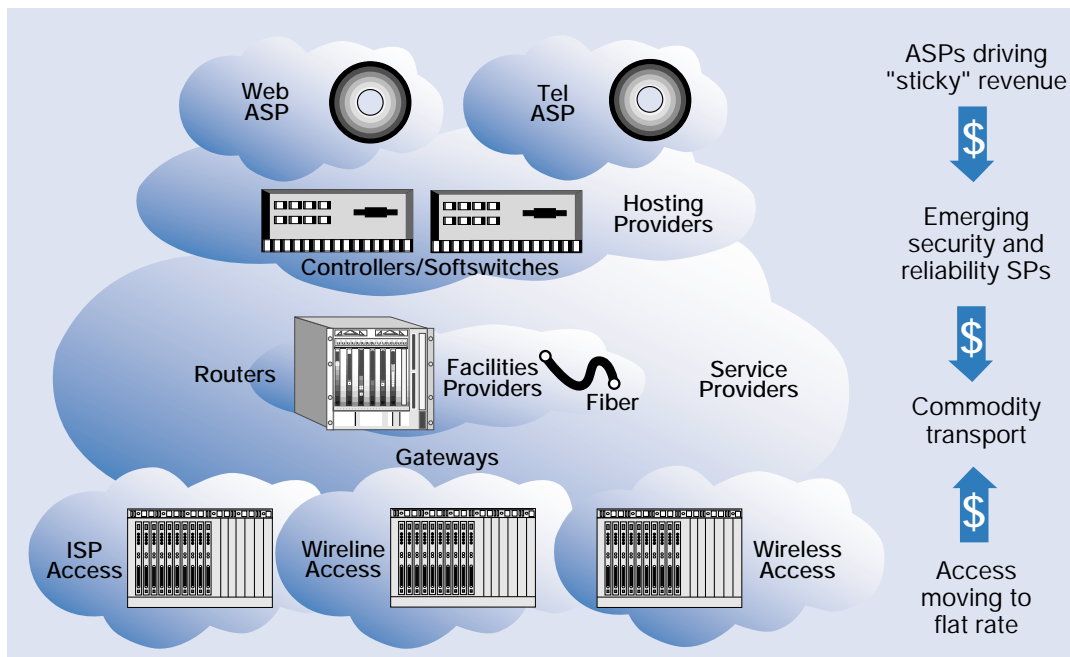
**By 2003, service providers will take in more than US\$10 billion in revenue from Internet-talk services.**

*(Source: IDC)*

In this new service provider landscape, ASPs are hot, attracting sizable venture capital funding and capitalizing on the industry-wide trend toward outsourcing. But it's a generalization to say they are focused only on outsourcing. Some business models are hosting-centric, some are connectivity-centric, and some are applications-centric.

We can see examples of this trend today. A new generation of competitive service providers is taking advantage of emerging converged network opportunities in areas like voice portals, unified messaging, and v-Business. These service providers are also introducing next-generation services on the Internet with familiar applications like personal assistants, Internet-based conferencing, and Internet call waiting.

## New Service Providers Landscape



## Advanced Service Applications

The opportunity for service providers is large and growing. By 2003, service providers will take in more than US\$10 billion in revenue from Internet-talk services according to IDC. These applications, a continuing way for service providers to differentiate themselves, will fall into four key categories.

1. Voice portal
2. Next-generation call completion
3. Next-generation messaging and advanced services
4. Network-based e-Business solutions


### *The Voice Portal*

The voice portal market is hot, expected to reach US\$5 billion by 2003 according to the Kelsey Group. More than 18 million U.S. companies will have used a voice portal service by 2005.

At its most basic level, the voice portal is about connecting end users to the network. The concept of an open Internet server has provided connectivity to the world's more than 250 million computing devices. We've seen dramatic growth in the number of connected computing devices. The idea that "everybody's connected" to the Internet has changed our personal and professional lives.

But take a closer look at the connectivity issue. There are still 1.3 billion other devices not connected to the Internet, including the burgeoning community of wireless phones. What we need is the voice equivalent of the Internet server — a standard way to give these users access to the rich content of the Internet.

The solution is *voice portals*, which let people call into Internet sites and complete transactions or get information from Internet-based applications using any phone and simple speech commands. Companies are providing online ordering, stock quotes and trades, and weather or traffic information over the phone — giving customers anywhere, anytime access to the company's Internet server. Intel® speech technology — continuous speech recognition (CSP) for automatic speech recognition (ASR) and text-to-speech (TTS) — is at the core of these solutions.



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### *Next-generation Call Completion*

Traditionally, call completion was equivalent to plain old telephone system (POTS) functionality, connecting people to people. But beginning in the early 1990s a new class of call completion applications hit the mainstream. These solutions offered basic connection services with new billing mechanisms like prepaid calling card and prepaid wireless. The liberalized telecommunications environment, combined with the availability of standards-based open building blocks from companies like Intel, created real business opportunities for new service providers to step in and offer these services. Service bureaus began offering services like calling cards for major carriers. These service bureaus were the predecessors of today's expanded base of service providers.

Yesterday's applications included circuit-switched prepaid calling card, prepaid wireless, and least-cost-routing. Today these same applications incorporate lower priced packet (IP) voice services and new functionality like Internet-based personal assistant and network-based contact center. The new call completion applications have a place in the next-generation network, where the core network offers basic connection services and application service providers deliver advanced call completion applications like prepaid.

### *Next-generation Messaging and Advanced Services*

The same technologies that enable voice portals are also being used in next-generation integrated messaging solutions, also known as unified messaging. Many Internet companies are providing email inboxes on the Internet. Now those same inboxes can also handle voice mails and faxes. Traditionally, you had to be at your desk to access these inboxes. New Internet-based, voice-enabled unified messaging services not only put all of your messages into a single inbox, they give you anytime, anywhere access using any phone — wireline or cellular — and simple speech commands. Road warriors and professional workers who are away from the office up to 80 percent of the day can easily and effectively keep in touch and manage their messages on the go. This application segment has expanded to include personal

assistant services, which act as subscribers' personal secretaries. They provide friendly, voice-controlled Rolodex\*; voice-controlled, network-based calendars and voice mail; and network features like conferencing, call return, and call forwarding.

The service provider market for unified messaging solutions is growing fast according to Frost & Sullivan. By selecting to outsource unified messaging, customers get the services they want without having to foot the bill for network infrastructure or management. Service providers have a significant opportunity in the converged communications market and an easy segue into additional e-Business and service opportunities like Internet and voice portals.



## *Network-based e-Business Solutions*

E-Business is quickly expanding to become more than just accessing the Internet server through a browser. Today it means a complete customer relationship management (CRM) solution including email, voice mail, and synchronized browsing capabilities.

Powerful, flexible contact center solutions are transforming yesterday's call center into tomorrow's customer contact center. And with flexible building-block technologies from Intel, they're easier than ever to build. Thanks to the new telecom system model, it's easy to add new features and functions, expanding an existing system without having to rebuild from scratch. All of this means an efficient, affordable, and tailored solution.

Yesterday's call center is evolving into a customer interaction center. Customers can send email, participate in videoconferences, or chat online — all from an Internet site. When they need more information about a product before making a purchase, customers can click a push-to-talk button on the site. This activates a voice-over-the-Internet connection that lets them talk to a live agent who can answer questions or close the sale. A push-to-talk option captures customers during the crucial moments of a purchase decision and can increase a contact center's sales up to 50 percent over those without it.

## **The Boom in Telecom Hosting**

As CIOs decide how to move to e-Business, they should have the flexibility of not only choosing who hosts the IT infrastructure, but also who hosts the telecom infrastructure.

Since it's built on open computing, the Internet lets your subscribers independently decide everything from who should build their e-Business application to who should support their e-Business infrastructure.

Internet hosting is becoming an increasingly popular choice for subscribers and an increasing source of revenue for service providers. According to IDC, the market for Internet hosting is projected to reach US\$16 billion by 2003. Companies now offering Internet hosting range from new startups like Digital Island, Exodus, Qwest, and even Intel to traditional professional services and telecom companies like AT&T, IBM, and MCI.

The benefits of hosting for subscribers extend beyond the simple staff and capital cost advantages. A hosting center can provide lower-cost Internet backbone access and service-level availability agreements. A hosting center can economically make the investment to support redundant network access, backup dialup access for maintenance, backup battery-based power, and industrial fire control. Hosting facilities also provide 24 hours a day, seven days a week monitoring — all the way up to the applications.

***The market for Internet hosting is projected to reach US\$16 billion by 2003.***

***(Source: IDC)***

Hosting is also opening up increasingly sophisticated possibilities — for instance, extending into e-Business and even enterprise resource planning (ERP). As a result, hosting no longer means just managing Internet servers. It now includes managed database software and managed e-Business application servers. In fact, hosting is now extending to provide almost a complete environment for every type of IT application. The next step is integrating with telecom.

## Voice-enabled e-Business — v-Business

All business is becoming e-Business. But for service providers, v-Business is the key to improving customer satisfaction and attracting new subscribers — and to growing profits. Today you can differentiate yourself in the marketplace with compelling new voice-based Internet solutions like voice portals; Internet-based, voice-enabled unified messaging and personal assistant services; and Internet gateways. Hosting powerful voice applications like contact centers and unified messaging provides even more opportunity.

What makes it possible is the expansive collection of standards-based building blocks from Intel, used with open protocols and programming interfaces. Freedom from infrastructure worries makes it easy to add powerful new services that let you stand apart from your competitors and help you succeed in today's increasingly competitive marketplace.

Whether you choose to host, buy, or build next-generation, Internet-enabled voice services, Intel can help you with your winning v-Business strategy. To find out more or get started now, visit <http://www.dialogic.com>, call 1-800-755-4444, or send email to [Telecomsales@intel.com](mailto:Telecomsales@intel.com).



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**Intel Corporation**

1515 Route Ten  
Parsippany, NJ 07054  
Phone: 1-973-993-3000  
Fax: 1-973-993-3093

**For more information**

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