



## **Imagination. Innovation. Results.**

**IBM's enterprise vision for pervasive computing**

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### **Pervasive computing: the next giant step in e-business**

About six years ago, IBM made a bold statement. We said that e-business would become the future of business. It was the next big opportunity. And we stood by that belief. It was IBM customers who first embraced e-business. And they have been a testament to its real, bottom-line business value.

A few years ago, we made another bold statement in saying that pervasive computing would become the next major evolution of e-business. Today, as in the past, we're supporting that conviction with a passionate investment in research. An extensive list of industry alliances. An absolute commitment to open, industry standards. And a willingness to drive innovation in the marketplace – whether it's testing a new technology or exploring a new way of doing business.

### **The challenge for your enterprise**

Taking advantage of the pervasive computing opportunity means leveraging nontraditional, embedded computing technologies – both wired and wireless – to enable, integrate and extend e-business opportunities and new applications. But the challenges for your enterprise remain the same. Improving productivity. Developing and applying better cost-management strategies. Finding new markets. Adding value to your existing customer relationships. Maintaining a competitive advantage so you can succeed in an ever-changing marketplace. While the challenges aren't new, the circumstances have changed dramatically.

Your enterprise – and for that matter, society – is starting to demand mobile business capabilities. Wireless laptops and handheld devices are supplementing traditional desktop systems. By the nature of their roles, many of your employees are already mobile. Your sales force. Field personnel. Globetrotting executives. The question is how to make their time on the move productive. Instead of doing paperwork. Trying to locate support team members to confirm prices and close a sale. Or waiting for critical inventory information to schedule a customer order. How does your enterprise take advantage of this new technology? How do you bridge the gaps between your employees – regardless of their locations or job responsibilities – and the information they need to access?

Making the leap to create an enterprise that can deliver any data or application and execute any transaction – over any network, to any device, at any time – is what IBM sees as the natural extension of e-business. And IBM is already building this extension today, developing and delivering the products, solutions and services that will make it all possible.

### **A sound infrastructure spells success**

In the world of e-business, infrastructure is the name of the game. Without a bulletproof infrastructure, even the most brilliant ideas won't succeed. Today, your infrastructure should extend from cell phone to mainframe, from smart car to customer database, and from personal digital assistant (PDA), cell phone or hardened mobile device to storage network. With the right infrastructure, you can drive down costs. Make information more accessible to the people who need it most. Streamline your business processes. Get to market faster. Move through the market with greater agility while you build long-term customer loyalty. And extend your reach into uncharted territory. The IBM software strategy for e-business helps you leverage your infrastructure investment to build a mobile access platform that helps achieve these goals.

Every step of infrastructure development includes making a choice between a proprietary solution or one built on open, industry standards. Only open standards give you the flexibility to change your technology strategies as your business needs change. To better integrate your existing disparate or legacy systems, whether purchased or inherited. And to free you from being tied to any one vendor or platform that may – or may not – be compatible with your future. That's why IBM has consistently championed an open, standards-based approach, designing our offerings to let you make choices now – and down the road.

Today, more people own mobile phones than own personal computers (PCs). In three years, PDAs will outnumber those PCs. At the same time, 25 percent of the workforce will be mobile. And many are saying that the primary source of contact with the Internet will be through a mobile device or appliance. Pervasive computing can extend your infrastructure to deliver the information your employees require, customers want and trading partners need through the devices they're already using. And to the myriad of devices yet to come.

“Right now, there are a variety of individual applications...from simple e-mail and calendar tools to sales-force automation, field-force routing, ERP...and an enterprise can choose any one or all of those business pains and easily address them,” offers Jon Prial, vice president of marketing, IBM Pervasive Computing. “The key is having a rich, flexible infrastructure that doesn't limit what you will be able to do tomorrow.”

### **Put the advantages of pervasive computing in practice**

Imagine one of your sales reps is making a customer call. Halfway through the appointment, the customer asks about the status of a recent order. They need the shipment for an incredibly time-sensitive project – and emphatically state they can't afford any delays. Reaching for her mobile phone, your sales rep uses the phone's secure wireless Web connection to pull up the order information from your office database. The information provided indicates that the order is scheduled to ship according to your agreed-to schedule. Your customer is happy. Your sales rep is relieved. By gaining the customer's confidence, you've just opened the door to future business opportunities.

The reality is that your sales force could be working this efficiently *right now*. Sales reps can input new orders on the spot – using a phone or PDA – before moving on to the next customer call. Update their calendars. Confirm a discount rate. Or change an order mid-stream when a customer changes his mind – even when their laptop or a network connection isn't available. That means having instantaneous access to update business critical information. The advantage? Less room for error between the time the order is placed and the time it enters your back-end system. Less time spent following up with customers who want to check order status or to make changes to one. And more time for your sales force to spend on core business activities. Like prospecting for new customers. Or nurturing the relationship with existing customers.

IBM is working on several projects that can accommodate the improved productivity illustrated in these examples, as well as scenarios that take your employees outside your wireless network. To make the most of these opportunities, the data you need must be stored on your device, so you don't need to have a network connection to access and interact with it. That can open opportunities for your sales reps to input an order nearly any time, any place, from almost any device and have it uploaded instantly when they come in contact with your wireless network. Or on command, depending on your users' preferences.

The current applications for this technology go well beyond your sales force. Executives, financial staff, field personnel and all your mobile employees can also take advantage of these technologies. Personal information managers (PIMs) offer calendar, to-do and address book functionality and can provide instant notification of meeting time and venue changes. Relay critical data residing on your network – when the meeting happens to be two time zones away from home – when an immediate decision has to be made.

Using location-based services, these applications can recognize a user's geographical moves. For example, allow a dispatcher to quickly locate the closest security personnel to aid in an emergency. Or help a busy executive keep up with a demanding schedule that spans continents. That way when he flies from Chicago to London, the device can be set to automatically arrange calendar appointments based on local time, so that the conference call at 2:00 P.M., EST is translated to 7:00 P.M., GMT, eliminating a conversion error. With pervasive computing, your employees can have access to the important information they rely on when they need it most, in the format that's most useful to them. The result? You can prevent information overload and package data according to your users' preferences and needs.

### **Give your employees the power to deliver outstanding service**

For field-service agents – like repair personnel – pervasive solutions can help them to better manage work assignments and improve response times. And reduce some of the frustrations your employees can experience when they don't have access to the people and information they rely on to get the job done.

Say one of your technicians has been assigned to a service call. When the technician gets to the site and diagnoses the problem, he immediately knows that the part needed for the repair isn't on his truck. Using a handheld device, he calls up the part number, sees that there are plenty in stock at the warehouse and sends a request for the part. In a few seconds, he gets an alert that there is another truck about to leave for a job nearby and will drop off the part. This saves your technician nearly an hour of driving time. In the interim, he can start to input his service report on the form designed for his handheld.

Once he finishes the job, he submits the completed service report, and his scheduler is notified he's available for another call. Good thing. Another customer a few miles down the road just called and needs help right away. Your technician can respond and focus on another customer – helping bring valuable productivity gains to your enterprise – without the looming worry of having to catch up with a pile of paper work at the end of the day.

### **From production to doorstep, supply chain efficiencies reap benefits**

In your distribution facility, pervasive computing can allow your inventory specialists to track every product on every shelf in realtime. So when order pickers make their way through the warehouse to pull product, their handheld devices use instant notification to automatically tell your database how many units you have in stock. Compare that number against recent order patterns. Let manufacturing know what it will take to meet your just-in-time delivery objectives. And tell them which carrier is assigned the shipment and when it's scheduled to depart.

Once the order leaves the warehouse, GPS chip technology can allow you to track the shipment all the way to your customer's door. By allowing crucial members of your enterprise to communicate instantly and effortlessly, you've just given yourself a means to help better manage carrying costs. Avoid manufacturing backlogs. And make sure your customers have what they need, when they need it. By helping to better connect and streamline your supply chain, you can drive down costs and make information work for you to consistently exceed customer expectations.

Shell Oil Company has chosen IBM as the lead integrator for its *e-station* prototype project. Conducted among a set of representative retail stations, the initial pilot will determine how Shell will rollout future technology in several major regions within its global retail business. The petrol stations included in the field trial will be installed with a variety of sensors and networked to a single control point.

The e-station prototypes allow Shell to monitor gasoline pumps to ensure they're flowing properly; measure light and air-conditioning usage; and track water pressure in car washes and HVAC conditions. The information is beamed by satellite to a central database. When data appears out of skew, the system will initiate a series of e-mails, alarms or pages to the individuals

who need to take action. If something goes awry, the technology provided by IBM will let employees be a step ahead of any potential fixes, rather than simply sending a service technician to diagnose the problem.

IBM was also recently awarded a major modernization contract for the U.S. Customs Service, which will incorporate significant pervasive computing capabilities. Currently, we're developing wireless solutions that will help inspectors using handheld or other personal devices, to better track data about cargo, people and other valuables as they cross U.S. borders. And make critical information more readily available to agents, whether they're posted at a border station or patrolling in the field.

These are just some examples of how pervasive computing can help increase enterprise efficiency and productivity while helping reduce costs and adding value to customer relationships. As the wireless circle widens to include your suppliers and customers, the opportunities and subsequent benefits can grow larger. According to a 2002 report from *Strategy Analytics*, "By 2005, 256 million customers will be generating almost 19 billion [mobile commerce] transactions, yielding \$186 billion in revenue." This is an opportunity for substantial revenue gains for those enterprises equipped to take advantage of these transactions – even if the prediction reaches only half its yield.

IBM believes the future will prove to be an exciting time for enterprises to engage in this next level of e-business. "Who knows what the next device will be – or even what the next transaction model will be – but IBM will be in a position to support our customers' desires to use these devices, on virtually any network, in almost any type of interaction with any system," says Prial.

### **We have the means to bring the vision to life**

IBM has backed our belief in the future of pervasive computing with a very tangible dedication to people, training and research resources. The breadth, performance and robustness of IBM's portfolio are delivering results for our customers right now. We are at the forefront of the IT industry in research and technology. And in 2001, we were awarded the most IT patents of any company in the world for the eighth consecutive year.

Our ability to help make all your systems work together – from back-end to end user – is a key differentiator. By offering a truly end-to-end approach to your pervasive computing initiatives, we're helping to keep costs and resource management challenges in check. Whether your enterprise already has pervasive initiatives underway or is just getting started. We're interested in doing pilot programs with you and developing first-ever applications that provide solutions that address real business challenges. IBM has more than 5,000 employees dedicated to pervasive computing projects and thousands more across the company who interact with wireless and pervasive computing in their product or service areas each day.

IBM's commitment to open standards remains both very strong and very public, helping to make that future possible. We believe that the best results for everyone – your enterprise, our company and IBM Business Partners – come from being open to the knowledge and insight of others working toward a common future. IBM is a founding member of SyncML, the Open Service Gateway Initiative (OSGi), the VoiceXML Forum and a member of the Embedded Linux<sup>®</sup> Consortium. We also contribute to the Wireless Application Protocol (WAP) Forum. And the Automotive Multimedia Interface Collaboration (AMI-C) has selected IBM as a contributing consultant in the development of AMI-C use cases, requirements and initial architecture. In short, we don't just talk about our support for open, industry standards. We work with them every day.

### **A proven track record**

When we made that bold statement about e-business six years ago, the customers who were willing to investigate the possibilities early on positioned themselves ahead of their competition. Whether through streamlining processes to cut costs or realigning business systems to deliver better service to their customers.

Still, there were critics who doubted that e-business would ever provide companies with real results. Our experience with more than 20,000 e-business customers has proven our ability to offer solutions that provide a host of solid benefits.



Improving operational effectiveness by getting the right information to the right trading partner at the right time.

For Safeway Stores, plc, one of the U.K.'s leading retail grocers, the benefits are measurable and self-funding. Safeway has seen a 10 percent improvement in promotion-item forecasting and 100 percent ROI in 11 months.

Building customer loyalty by offering new, value-added services before the competition.

Working with IBM, Japan Airlines (JAL) was one of the first airlines to offer ticketing, scheduling and other customer services through WAP phones – helping to create deeper connections with its customers. Since implementation, JAL's integrated system has smoothly processed the additional 40,000 wireless transactions it now handles each day.

### **Looking forward**

Pervasive computing is already taking shape to provide the results your success will be measured by tomorrow. The future of pervasive computing is no longer a matter of if – or even when – but *how*. And just as with e-business, getting started early can help give your enterprise an advantage. By starting out small with projects that allow you to quickly measure results, you can introduce these capabilities gradually – giving your employees a chance to get acquainted with the technology. And your enterprise an opportunity to formulate a strategy for rollouts to other groups of users.

What will the future hold? With IBM's developments in telematics and voice, sales reps could have their e-mail from the office read to them in the car using IBM voice technologies as they drive to their next appointments. While driving, reps can reply verbally, hands-free and stay in constant contact with their home offices. To save more time, navigation systems in the car can provide directions (again by voice) to the next appointment. Without being confined to working from a laptop and a wired network connection, your road warriors can now truly work on the move. Without having to stop for paperwork or administrative tasks. That can equal higher levels of productivity. Which can drive more revenue. All by improving the information transfer between your enterprise systems and your employees.

At IBM's Austin Research Lab, we're seeing glimpses of tomorrow every day. Our work on standard, short-range wireless communication industry specifications that allow portable, personal devices to interact with each other and with other stationary devices has opened a new realm of possibilities. As electronic devices grow smaller and require less power, IBM sees the emergence of exciting new opportunities for devices to communicate with us individually and with one another. Including Personal Area Networks (PANs), where intelligent devices – including cell phones, PDAs, portable video games and pagers, as well as those currently being developed – will be able to share data and communicate with each other. And create individual networks that can allow users to better manage the information they rely on day in and day out. The scope of possibilities is nearly limitless.

By helping to make it simpler for a host of devices to communicate with each other – the pump at the gas station and your wireless-networked vehicle, or your digital camera and your handheld device – IBM is finding new ways to make better use of short-range data transfers. Someday soon you'll be able to pull up to a gas pump and your car will tell the pump how much gas it needs as well as the grade. Then it will prompt you for your PIN to authorize the transaction. Before you've ever left your car. You'll be able to download that lengthy presentation file your assistant has been putting together for your afternoon appointment as your tank fills. With a wide range of practical uses, this is just one of the emerging technologies that will help create a very exciting future for you and your customers.

### **Start defining your advantage today**

Right now, enterprises around the globe are building the framework for their pervasive-computing initiatives. Some of the earliest adopters are already bringing these capabilities to their employees, suppliers and customers and are realizing bottom-line results. The time to learn where pervasive computing can take your enterprise is now. And there's no better place to turn for strategy, hardware, software, hosting and consulting than the company that led the way in defining e-business.

To learn more about how your enterprise can benefit from the next evolution of e-business, contact your IBM marketing representative or visit **ibm.com/pvc**. In North America, you can also call 1 800 Talk-2Me. If you're outside North America, send e-mail to [pervasive@us.ibm.com](mailto:pervasive@us.ibm.com).



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