



# **The Increasingly Important Impact of Wireless Broadband Technology and Services on the U.S. Economy**

**A Follow up to the 2005 Ovum Report on the Impact of  
the US Wireless Telecom Industry on the US Economy**

**A Study for CTIA-The Wireless Association®**

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## Executive Summary

Following up on our 2005 Report, *The Impact of the US Wireless Telecom Industry on the US Economy*, we have reviewed the data available to us and conclude that the proliferation of mobile wireless technology and services in the United States, particularly wireless broadband, is having a massive impact on the productivity of the entire U.S. economy, and in particular is having a significant impact in five key states. Further, we find that small businesses and the health care sector in particular are realizing significant benefits from the implementation and use of wireless broadband.

In sum, we find that:

- In 2004, mobile voice services generated productivity gains to the U.S. economy worth \$157 billion per year.
- In 2005, mobile wireless broadband services generated productivity gains to the U.S. economy worth \$28 billion per year.
- In 2005, the **productivity value of all mobile wireless services was worth \$185 billion, greater than the total value of the U.S. pharmaceutical industry (according to BizStats.com).**
- Between 2004 and 2005, the productivity enhancements generated by the use of mobile wireless broadband tripled in value.
- In 2005, 68.8 million US enterprise users had mobile wireless services, with only a quarter using mobile wireless broadband. By 2016, the US is projected to have 81.9 million mobile enterprise users, with 83 percent using wireless broadband.
- **Health care and small businesses are the big winners.** In 2005, productivity improvements due to use of mobile broadband solutions across the U.S. health care industry were worth almost \$6.9 billion. By 2016, that number will triple to \$27.2 billion, or twice the size (according to Bizstats.com) of the current vocational rehabilitation sector of the health care industry. As demonstrated in several case studies provided in this Report, small businesses are uniquely empowered by implementation and use of wireless broadband technologies and applications.
- **To put this information into context, consider that by 2016, the value of the combined mobile wireless voice and broadband productivity gains to the US economy -- \$427 billion per year -- will exceed today's motor vehicle manufacturing and pharmaceutical industries combined.**



## Overview

### I Introduction

This report updates a 2005 Ovum report regarding the impact of the US wireless telecom industry on the US economy in the year 2004 and its expected benefits over the next ten years.<sup>1</sup> The 2005 Ovum Report focused on the macroeconomic impact of the US wireless telecom industry as measured by taxes and fees paid to various levels of American government, by job creation, and by other macroeconomic metrics. This follow-on report focuses on the impact that the deployment and use of wireless broadband technology currently has, and is projected to have, on the US economy as measured by productivity gains.<sup>2</sup> The conclusions reached in this report are largely based on publicly available data from US wireless carriers and the overall wireless telecom industry, as well as Ovum's own independent analysis and research. **This report confirms the findings of the earlier study: the US economy is deriving significant benefits from the use of wireless technology; in fact, the economic gains exceed Ovum's original estimates.**

### II Productivity gains from wireless services

For several decades before the mid-1980s, the United States lagged both Japan and the European Union in GDP growth. But over the last ten years, and especially in 2005 and 2006, the United States has outpaced Japan and the European Union in labour productivity growth. The principal cause for this turn-around has been the widespread and thorough adoption of information technology, computers, and telecommunications to reengineer business practices and improve productivity.

While the Internet and computers have won much of the credit for improving productivity, telecommunications, and especially wireless telecommunications, has become an essential component in generating productivity gains for American businesses. Mobile voice telecommunications devices are now in common use by consumers and businesses alike. At the end of 2005, more than 208 million Americans – 24 million more than in 2004 – used wireless phones, and more than 60 million of them used wireless phones for business purposes. Since then, total wireless subscriptions have risen to more than 250 million.

It is clear that wireless voice services play a central role in enabling productivity growth. Examples are not hard to find. In 2004, we estimated a \$157 billion consumer surplus per year based on the improved efficiencies associated with wireless voice service.

The focus of this update is the productivity gains from wireless **broadband** services. As we established in the 2005 Ovum Report, the relatively new wireless broadband services are also now starting to improve US productivity. In the original 2005 report we estimated that in 2004, productivity gains from wireless data were worth in excess of \$8 billion. This updated study finds that in 2005, the productivity gains increased to \$28 billion. To put this in context, in 2005,

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<sup>1</sup> The Impact of the US Wireless Telecom Industry on the US Economy, A Report for CTIA-The Wireless Association™, Roger Entner & David Lewin, Ovum, September 2005 ("2005 Ovum Report").

<sup>2</sup> In this context, wireless broadband means non-voice applications or advanced voice applications such as multimedia messaging as well as high-speed data transmission capabilities.



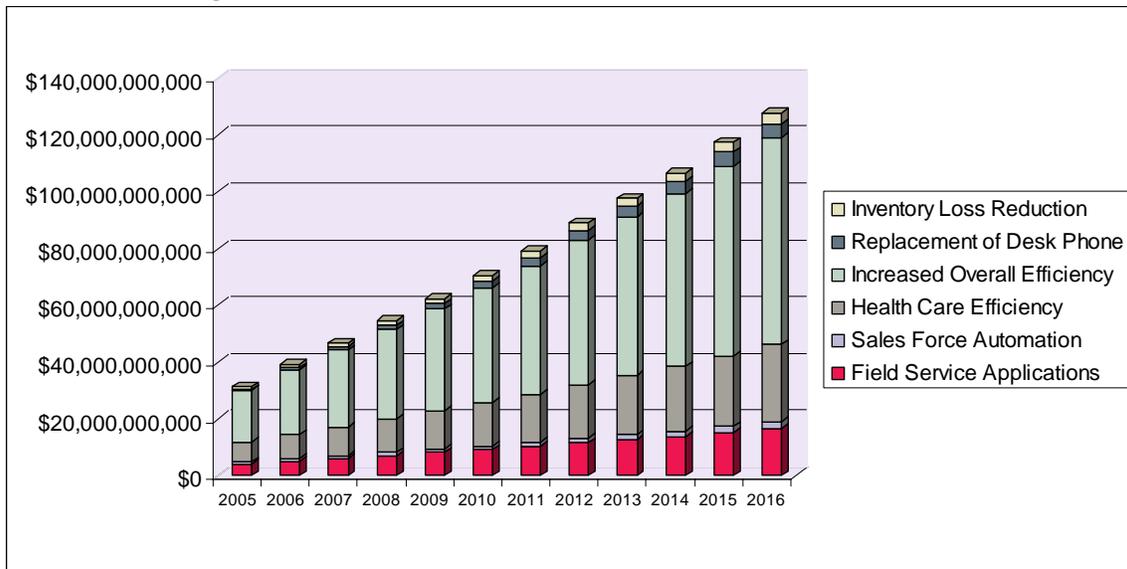
productivity gains and cost savings from the wireless industry were larger than the Gross State Product of North Dakota.

### III Future benefits from wireless services

In deciding future policy towards the regulation of wireless broadband services, the US government and its regulatory authorities will no doubt take account of the **existing** economic benefits generated by the wireless industry. However, they should also be equally, if not more, interested in considering the impact of their decisions on potential **future** benefits.

Over the next 10 years, we can expect the productivity gains from the deployment and use of wireless broadband services to become much more important. We estimate that productivity gains will generate almost \$860 billion in additional GDP over the next decade, an increase of our original estimate of \$600 billion. This readjustment is attributable to the increased number of enterprises and their employees using wireless broadband technologies and the deployment and adoption of new applications in the enterprise space which we did not foresee during the 2005 study.

Figure 1 Total Annual Economic Benefits of the Six Tasks Identified



As indicated in Figure 1, the productivity gains and savings for the US economy are staggering. The overall increased efficiencies resulting from the use of wireless broadband applications can be expected to yield savings of over \$528 billion during the 2005-2016 time period. As discussed further in Section 1.2 below, we calculated this savings estimate by taking into account reductions in labour costs across specific industry segments, extrapolating these savings across an entire industry sector and then further extrapolated across the entire U.S. economy. For example, savings in the health care industry alone will contribute \$197 billion, with field service applications adding another \$119 billion. Enterprise replacement of desk phones with mobile devices will yield additional savings of \$32 billion. Sales force automation and inventory loss reduction will save another \$17 billion and \$26 billion, respectively.



To put the \$860 billion in additional productivity gains in context, consider the following:

- the total budget of the U.S. Department of Health and Human Services in Fiscal Year 2008, including the Medicare and Medicaid programs, was \$737 billion
- the remaining \$123 billion in savings is almost exactly double the amount the Federal Government enacted for all homeland security programs across all agencies in Fiscal Year 2008.<sup>3</sup>

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<sup>3</sup> <http://origin.www.gpoaccess.gov/usbudget/fy09/pdf/budget/tables.pdf>



# 1 US productivity gains from use of wireless broadband services

## 1.1 Productivity gains from wireless voice services

It is clear that wireless **voice** services play a central role in enabling productivity growth. At the end of 2005, more than 70% of Americans, or roughly 208 million Americans, used mobile wireless devices. For almost 40%, or roughly 77 million American wireless consumers, their employer believed that the use of a wireless device had such a significant impact on productivity that the employer paid at least part of their employees' wireless bill.

Examples of productivity gains from use of wireless voice services are not hard to find. They include:

- *Faster and more efficient decision-making;*
- *Reduction of unproductive travel time;*
- *Significant improvements in logistics; and*
- *Empowering small businesses.*

## 1.2 Productivity gains from wireless broadband services

Substantial productivity gains have already resulted from the growing deployment and use of wireless broadband services. Even though the widespread adoption of these services is in its infancy, this report includes a number of case studies that show that the productivity gains from data applications are considerable. And they further confirm that the kinds of productivity enhancements generated by deploying wireless broadband directly benefit enterprises of all sizes, but especially small businesses. Small businesses are expected to reap gains because of the benefits that the mobility aspect of wireless broadband provides, such as not having to staff a head office, more ready access to corporate information, field service automation and better use of travel time. Eighteen of these studies are included in the Appendix and confirm that deploying wireless broadband services enable better decision making, more efficient use of resources and reduction in costs.

To quantify the productivity gains US business currently, or will, experience from the deployment and use of wireless broadband technologies, we have conducted a thorough review of the job classification data from the U.S. Department of Commerce's Bureau of Labour Statistics (BLS). As in 2004, we again examined the BLS' 821 different job types affecting 130.3 million employees. We then determined which jobs would benefit from the use of mobile wireless voice and broadband technologies. We identified 360 job types encompassing 81.9 million employees (in 2004, these categories employed 75.8 million people) that would benefit from using wireless technology more broadly. At the end of 2005, only 68.8 million of these employees were actually using wireless, predominantly for voice service.

Beyond this, however, there are also substantial productivity gains to be realized from the implementation and use of wireless broadband services. While wireless **voice** penetration is high among enterprise users, *wireless broadband* penetration is still in its first stages. Based on conversations with wireless carriers and publicly available information from financial reports,



Ovum estimates that 25% of the 68.8 million current wireless enterprise users are actually using a deployed wireless broadband solution. As shown in Figure 2.3, we expect this number to grow to 83% of the 81.9 million employees across the 360 job categories we identified using BLS information.

**Figure 2 Wireless-Only Voice and Wireless Broadband Penetration among Enterprise Employees**

Year	Wireless Voice Penetration among Business Users of Telecom Services	Penetration of Wireless Broadband among Business Users of Telecom Services
Already using in 2005	84%	25%
2006	87%	30%
2007	88%	35%
2008	90%	40%
2009	91%	45%
2010	92%	50%
2011	94%	55%
2012	95%	61%
2013	96%	66%
2014	97%	71%
2015	99%	77%
2016	100%	83%

Source: Ovum 2007

With input from businesses already using wireless broadband technology to improve their productivity and reduce costs, Ovum was able to identify six situations in which deployment and use of wireless broadband is undoubtedly providing tangible economic benefits:

1. Resource and inventory management and documentation
2. Health care efficiency enhancements
3. Field service automation
4. Inventory loss reduction
5. Sales force automation
6. Replacement of desk phones with mobile wireless devices

As noted above, the increased efficiencies and reduction in costs that use of wireless broadband produces across these six types of activities are likely to impact 360 job types and more than 81.9 million employees. To be as conservative as possible when quantifying the benefits, we used, when applicable, labour cost reductions rather than sales increases from the productivity gain. For example, in assessing the economic impact of Field Service Automation on tree trimmers, we used a multiple of the tree trimmers' average hourly wage of \$21.68 rather than the increased revenue of up to \$100 per hour and up.



### **More efficient management and documentation**

As described in the several case studies set forth in the Appendix, supervisors, managers, and executives can add approximately 30 more productive minutes to their day by answering e-mail on their wireless devices, or by taking down information on their handheld and then synchronizing with the office PC laptop rather than copying paper notes, and later inputting that information into a computer. This practice among enterprise managers has already led to an economic benefit for American business of almost \$18 billion in 2005.

### **Health care efficiency enhancements**

Health care is one of the most labour intensive industries as well as one of the most sensitive to error. One way that health care providers have been able to reduce the costs associated with providing high quality health care is through increased use of wireless technology. By directly inputting patient information via a wireless handheld, health care providers have been able to reduce the amount of call-backs and follow-up required because of illegible notes and prescriptions. Shands Healthcare's effort to mobilize its workforce to provide better service is one example that illustrates how significant this shift has been. In 2005, almost \$6.9 billion was saved across the entire U.S. health care industry, as measured by productivity enhancements, by using wireless technology in the medical field. In addition, another \$900 million in savings was realized by reducing inventory loss through wireless tagging of devices and instruments.

### **Enhancements in Field Service Automation**

By switching from paper and landline telephone tracking methodologies to automatic, wireless GPS location detection and least-distance routing, companies are able to mobilize and deploy their field service work force significantly more effectively and efficiently. Examples like Joe Gibbs Racing and Best Buy's Geek Squad show how both traditional and radically innovative applications reduced costs to enterprises relying on field service workforces by more than \$4.1 billion in 2005.

### **Inventory Loss Reduction through Wireless Automation**

Several companies, such as OrthoRehab mentioned in the 2004 Ovum study, state that they were able to reap substantial savings, consistently around \$1,250 per month per employee, because they deployed wireless inventory management tools and were able to minimize lost inventory. This kind of savings extrapolated across other industries dependent on effective inventory management -- as a way to minimize costs -- confirm that wireless inventory tracking applications have increased cost savings for American businesses from almost \$272 million in 2004 to approximately \$920 million in 2005.

### **Sales Force Automation**

US businesses have been aggressive in automating their sales forces, including issuing wireless modem cards to sales teams. Success stories like TaylorMade or Adidas as detailed in the Appendix illustrate how American companies were already saving more than \$600 million in 2005 by providing their workforce with wireless broadband technologies.



## Replacement of Landline Phones

More and more US businesses are replacing traditional desk phones with wireless alternatives, thereby mobilizing their employee base. Companies like Ford are trailblazers in this regard. Ford established a virtual office for 800 engineers, saving the company money through the in-network free calling feature that turns the entire United States into a virtual office for Ford employees. This mobile, virtual office accelerates how Ford and many other companies now do business, faster and more efficiently.

### 1.3 The current economic savings in the United States and the five largest States

The cost savings resulting from significant adoption of wireless technology increased substantially from 2004 to 2005. This report for the first time determines the economic savings in the five most populous states. In 2005, the following economic savings due to deployment and use of wireless broadband technologies in these states were generated:

**Figure 3: Economic savings for the United States and its Five Largest States in 2005 Due to the Deployment and Use of Wireless Technologies and Devices:**

United States	\$33.1 billion
California	\$3.5 billion
New York	\$2.1 billion
Florida	\$1.6 billion
Texas	\$1.6 billion
Illinois	\$1.3 billion

Source: Ovum 2007

Details follow in Section 2.4.



## 2 Future economic benefits

### 2.1 Summary

As Chapter 1 shows, wireless broadband services and technology are only just beginning to improve the productivity of American workers. Over the next 10 years, we expect accelerated deployment of wireless broadband technologies and applications to generate further productivity gains in the amount of almost \$860 billion. This is an increase from our 2004 estimates of \$660 billion in productivity gains.

This additional benefit to the US economy confirms that the U.S. government's 1993 light-handed approach towards regulating the industry was the correct approach. The decision to forbear from micromanaging technology developments and deciding not to impose economic regulation on the wireless industry continues to allow it to evolve in a manner that maximizes positive economic impact in the US, for the benefit of the American people. By contrast, to the degree that Federal, State and local governments revert to micromanaging the technical and economic aspects of the industry, the anticipated growth and resulting economic benefits described in this Report will slow, if not disappear altogether.

The effects of wireless broadband deployment and use described in this Report reflect only the beginning. We expect the impact that the mobile wireless industry will have on the US economy will be profound and transformative. The technologies and services discussed in this paper are only those currently available today. They are the proverbial "low hanging fruits" of wireless broadband. Considering that, the benefits are staggering. Over time, as has happened in the computer industry or with the Internet, the "long tail" of additional productivity benefits will emerge, further enhancing the competitive posture of American businesses and thereby maximizing benefits to consumers.

### 2.2 The need to consider future benefits

It is clear from the previous chapter that the US mobile wireless industry already generates substantial economic benefits to the overall economy, and the economies of specific states. In deciding future regulatory policy for wireless services, the US government should obviously consider these existing benefits. However, they are equally well advised to consider the impact of their decisions on *future* benefit streams. Over the course of just one year, estimates of these future benefits have increased from \$660 billion over a 10-year period to \$860 billion, based on our estimates derived from the 360 job categories discussed in Section 1.2 because of wider deployment and use of wireless broadband technology and applications. Any changes in the regulatory environment may jeopardize the anticipated economic benefits that the wireless industry is providing to the US economy overall. In this chapter, we discuss these future benefits.

### 2.3 Future benefits from implementation and use of wireless broadband services

Wireless telecom services generally, and wireless broadband specifically, including location-based services, will play a central role in maintaining and improving US competitiveness in world markets. In Chapter 1, we identified and quantified current productivity benefits realized from the



use of a number of existing wireless broadband services. To estimate future benefits, we use a conservative approach in which we:

- consider only the six categories of activities where wireless broadband services have been identified as having impacted productivity, identified in Chapter 1, where we can already observe tangible productivity benefits;
- assume that enterprise employees using wireless services will grow from the currently estimated 68 million to almost 82 million by 2016;
- assume that for each of the six categories of activities discussed in Chapter 1, the proportion of relevant employees using the six applications will grow from 25% to 83% of the potential wireless user base as shown in Figure 3 and thereby the number of wireless broadband users will grow from 17 million to 68 million.

**Figure 4 Wireless-Only Voice and Wireless Data Penetration among Enterprise Employees**

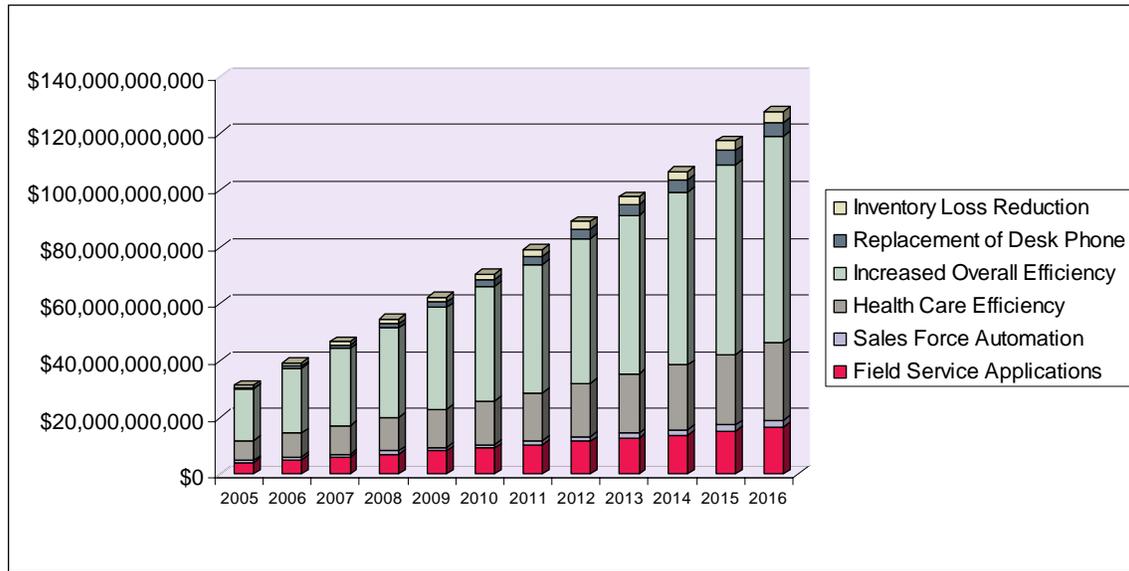
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2015	99%	77%
2016	100%	83%

Source: Ovum 2007

Figure 5 shows that the sum of the expected annual future benefits during the next 10 years from improved productivity across the six categories discussed in Section 1.2 is expected to increase from approximately \$33.1 billion in 2005 to \$127 billion in 2016.



Figure 5 Total Annual Economic Benefits of Increased Productivity Across Six Applications



Source: Ovum 2007

When we review the following categories of economic activity in detail, we can delineate the future economic benefits for each. These include:

**More efficient management and documentation** via wireless applications will yield at least an additional 30 minutes per day that can be put to productive use, representing savings for US companies increasing from \$18.4 billion in 2005 to almost \$73 billion in 2016.

**Health care efficiency enhancements** through implementation of wireless broadband solutions will increase from almost \$6.9 billion in 2005 to \$27.2 billion in 2016.

**Enhancements in field service automation** through use of wireless broadband applications yielded cost savings of \$4.1 billion in 2005, and will increase to \$16.5 billion in 2016. Both the current savings and the savings over the 10-year period assessed exceed the initial expectations set forth in our 2004 study. We believe this is because more enterprises have subscribed to and deployed wireless broadband technologies and applications than we originally expected, this increased level of deployment has actually increased the utility of the wireless applications beyond what the wireless application developers originally intended and foresaw.

**Improved inventory management and reducing inventory loss** through wireless technology created savings of approximately \$918 million in 2005, and will increase to roughly \$3.6 billion in 2016 as shown in Figure 4.

**Sales force automation** generated cost savings of at least \$607 million in 2005 and is expected to increase to almost \$2.4 billion in 2016. Companies like Adidas and TaylorMade have more rapidly embraced sales force automation applications than we initially expected, and we believe their actions are typical across enterprises using sales forces.



**Replacement of landline desk phones with wireless devices is accelerating.** Companies like Ford are leading the way in creating savings of at least \$245 million in 2005, which will increase to at least \$4.9 billion even if only half of all wired enterprise go mobile.

### **Additional applications**

In addition to the categories of enhanced productivity identified above, we expect that wireless broadband technologies and applications will positively impact other enterprise activities over the next five years. These impacts will only increase productivity and will consequently produce even greater cost savings for US businesses. For example, we expect that:

- business processes will be reengineered to fully utilize the mobility aspects of wireless broadband applications, thereby increasing productivity across all segments of enterprise activity.
- the level of knowledge among sales forces and other field employees will increase and become more useful in real-time situations and problem-solving. This includes employees remotely connecting to a central office location or source of expertise. This capability will directly impact asset management and tracking and knowledge transfer. It will also affect on-site and mobile inventory, reduce waiting times and eliminate duplicative and unnecessary expenditure of personnel and other resources.
- mobile telematics solutions are expected to generate significant efficiencies and increased productivity for the various utility industries. The trend towards remote, mobile monitoring is expected to continue. For example, based on Ovum research in the United States, the cost of manual meter reading in rural areas is often in excess of \$20 per month per meter read, compared to only \$2 in urban areas. At a cost of often less than \$13 per month per meter read, combined with declining equipment costs, telematics solutions for utility companies are expected to become a source of significant cost savings for utilities.



## 2.4 Discussion of the five States

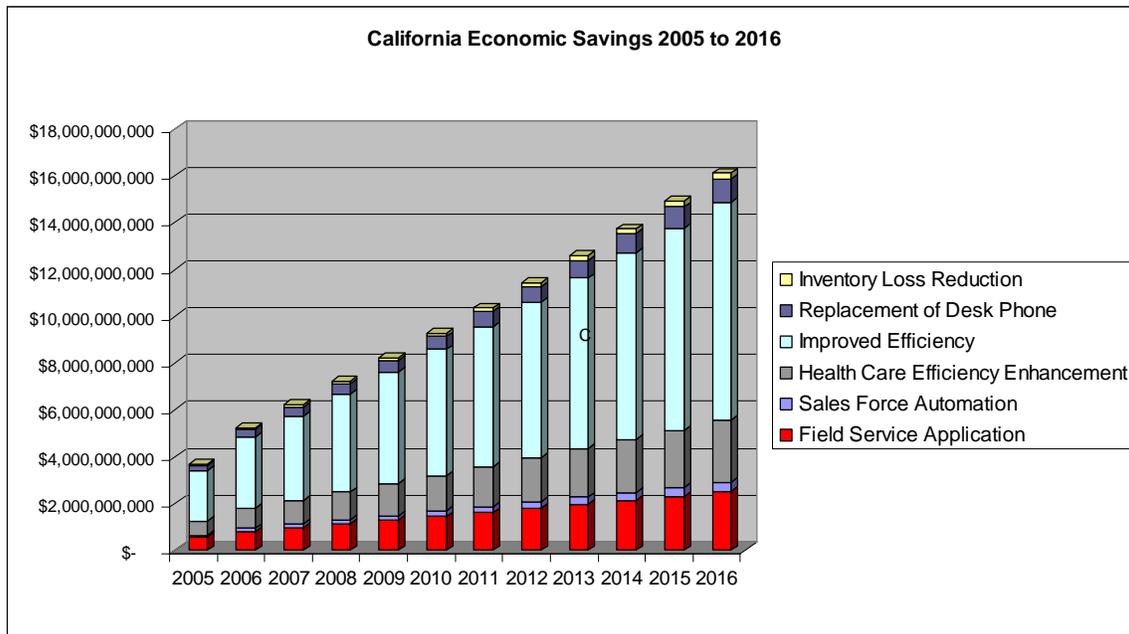
As the five largest States, California, New York, Florida, Texas and Illinois are naturally some of the largest beneficiaries of the wireless revolution; however, the composition of each State's economy varies widely. For the five States discussed below, the relative impact on the total economic benefit in each State from the increased use of wireless broadband applications has been determined based on the relative share of different types of economic activity (for instance, health care, inventory management, or sales activity) in each State.

In sum, the economies of these five States are realizing 37% of the total US economic benefit derived from deployment and use of wireless technology, proportionate to their population. Their combined yearly cost savings attributable to the implementation and use of wireless broadband applications and technologies are expected to increase from \$10.1 billion in 2005 to more than \$47 billion in 2016.

### California

The largest state economy in the United States realizes a corresponding, large benefit from the deployment and use of wireless technology. We estimate that the annual cost savings to businesses in California will increase more than threefold in ten years, from \$5 billion in 2006 to more than \$16 billion in 2016.

**Figure 6: Cost Savings in California Due to Use and Implementation of Wireless Broadband Technologies 2005 to 2016**



California's large service and manufacturing sectors indicate that the lion's share of the cost savings that the use and deployment of wireless broadband service applications generate will flow from inventory loss reduction, sales force automation, and field service applications. We estimate that cost savings to enterprises in California will increase from \$3 billion to \$9.6 billion

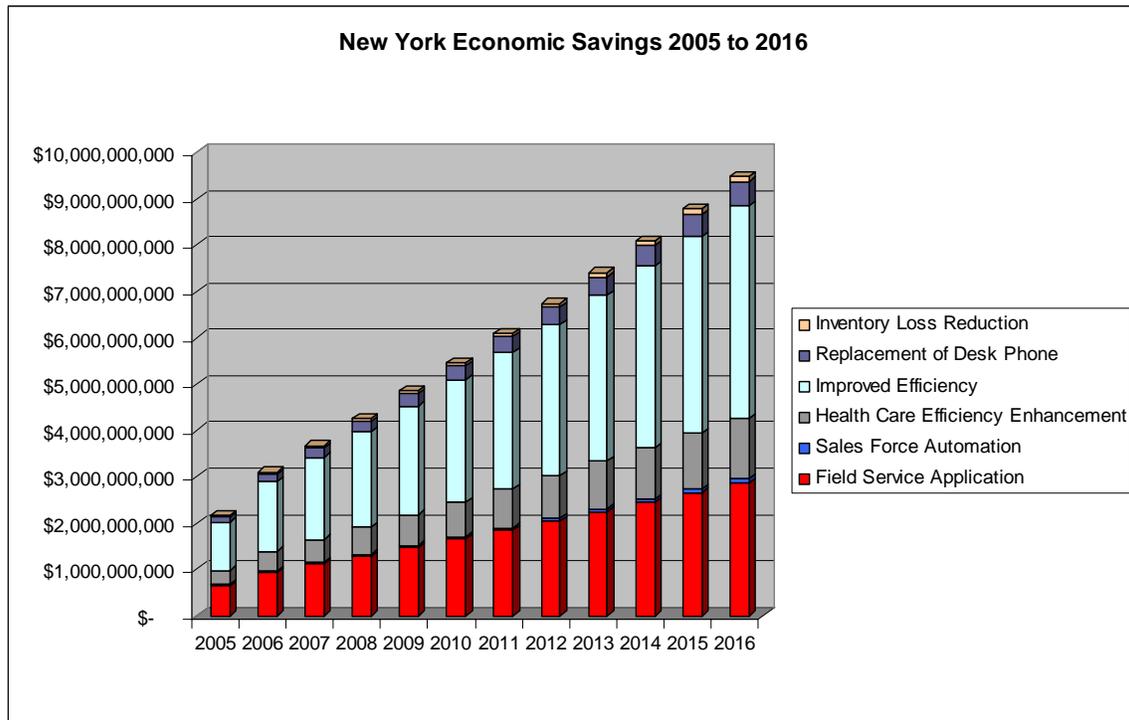


from inventory loss reduction, and from \$819 million to \$2.6 billion with sales force automation between 2005 and 2016.

### New York

Businesses operating in New York, the second largest state economy in the United States, will realize economic savings rising from \$2.9 billion in 2005 to \$9.6 billion in 2016.

**Figure 7: Economic Savings in New York 2005 to 2016**



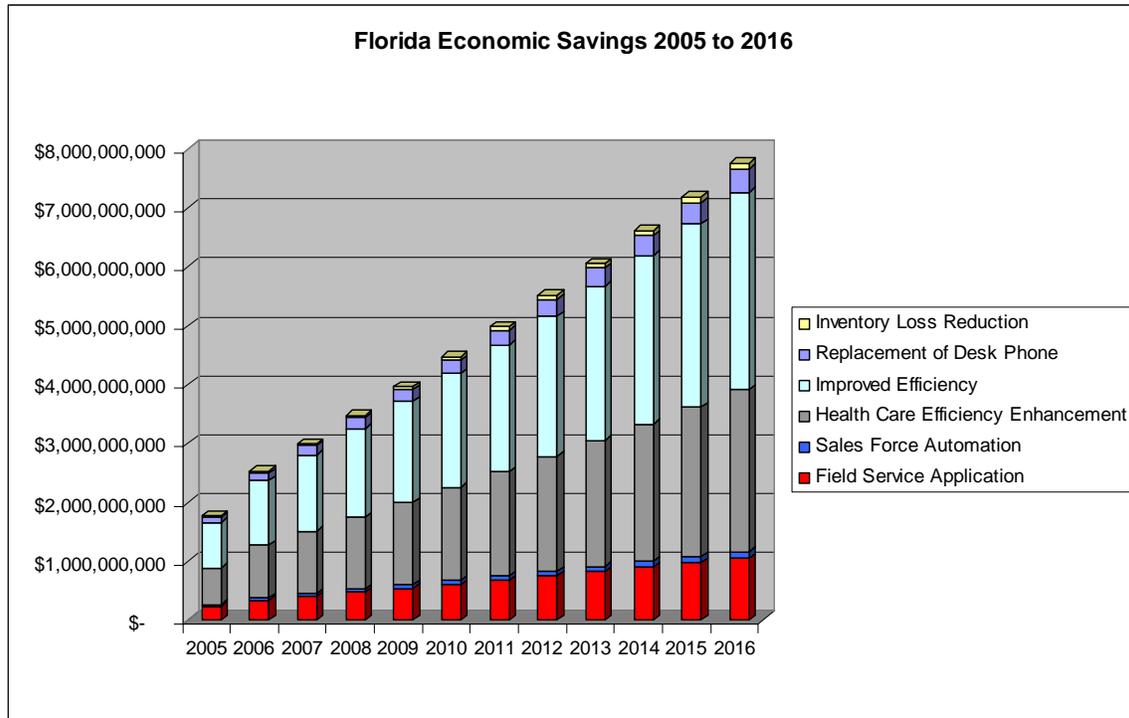
The largest savings are again from improved efficiencies and reduction in costs. We estimate savings will increase from \$1.5 billion in 2005 to more than \$4.7 billion in 2016. In New York, field service applications constitute the second largest industry sector in the state. Consequently, with the deployment of wireless broadband services and applications across this segment, cost savings will increase from \$936 million in 2005 to \$2.7 billion in 2016. Health care savings will increase in the same period from \$426 million to more than \$1.3 billion. The replacement of desk phones by New York companies will yield savings of about \$38 million in 2005 to over \$320 million in 2016.



## Florida

As wireless broadband technologies are deployed and used by more enterprises in Florida, the state's economy will enjoy annual projected savings rising from almost \$1.7 billion in 2005 to \$7.8 billion in 2016.

**Figure 8: Economic Savings in Florida 2005 to 2016**

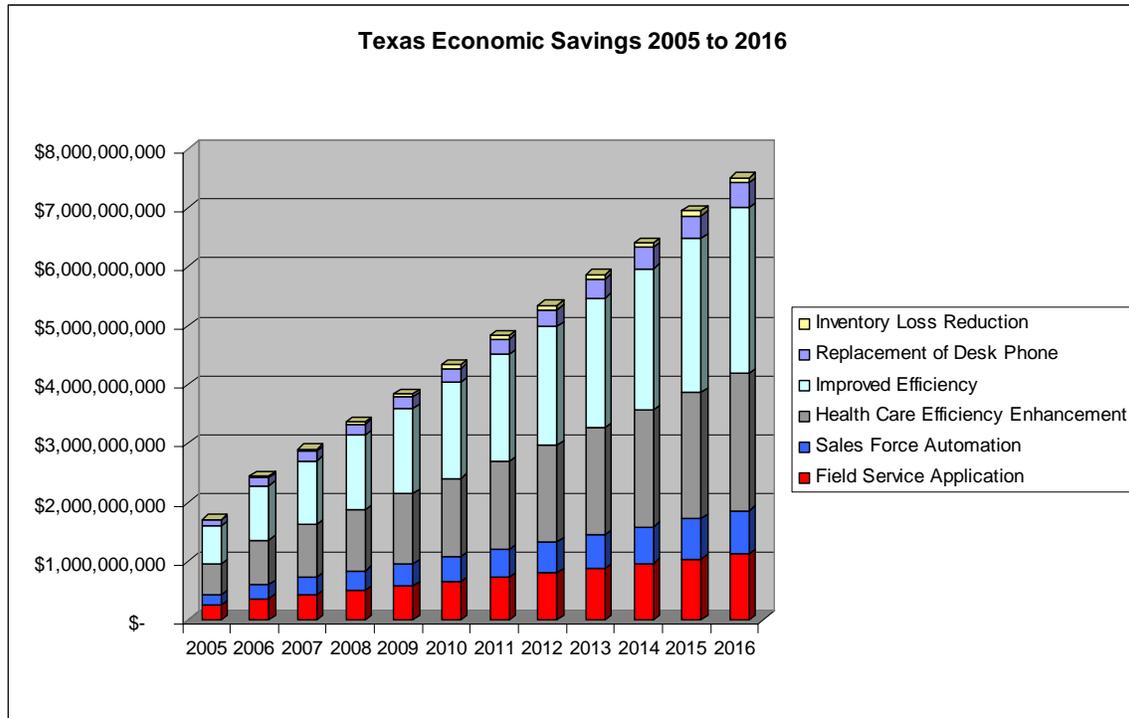


Because of the size of the health care sector in Florida, the savings expected from deployment and use of wireless broadband applications in this sector will increase savings from almost \$900 million in 2005 to over \$2.8 billion in 2016. Use of wireless broadband applications in the field services industries, while still the third largest industry segment in Florida, is relatively modest. Nevertheless, the savings generated by deployment and use of wireless broadband technology are expected to increase from \$343 million in 2006 to almost \$1.1 billion in 2016. Enterprise replacement of desk phones will save almost \$30 million in 2005 and increase to \$249 million in 2016. As mobile broadband applications are used more pervasively for inventory loss prevention, savings for Florida business will grow from \$30 million in 2005 to \$105 million in 2016.

## Texas

The economy of Texas benefited from the application of wireless technology by more than \$1.6 billion in 2005 alone, and we predict that the benefits will increase to more than \$7.6 billion in 2016.

**Figure 9: Economic Savings in Texas 2005 to 2016**



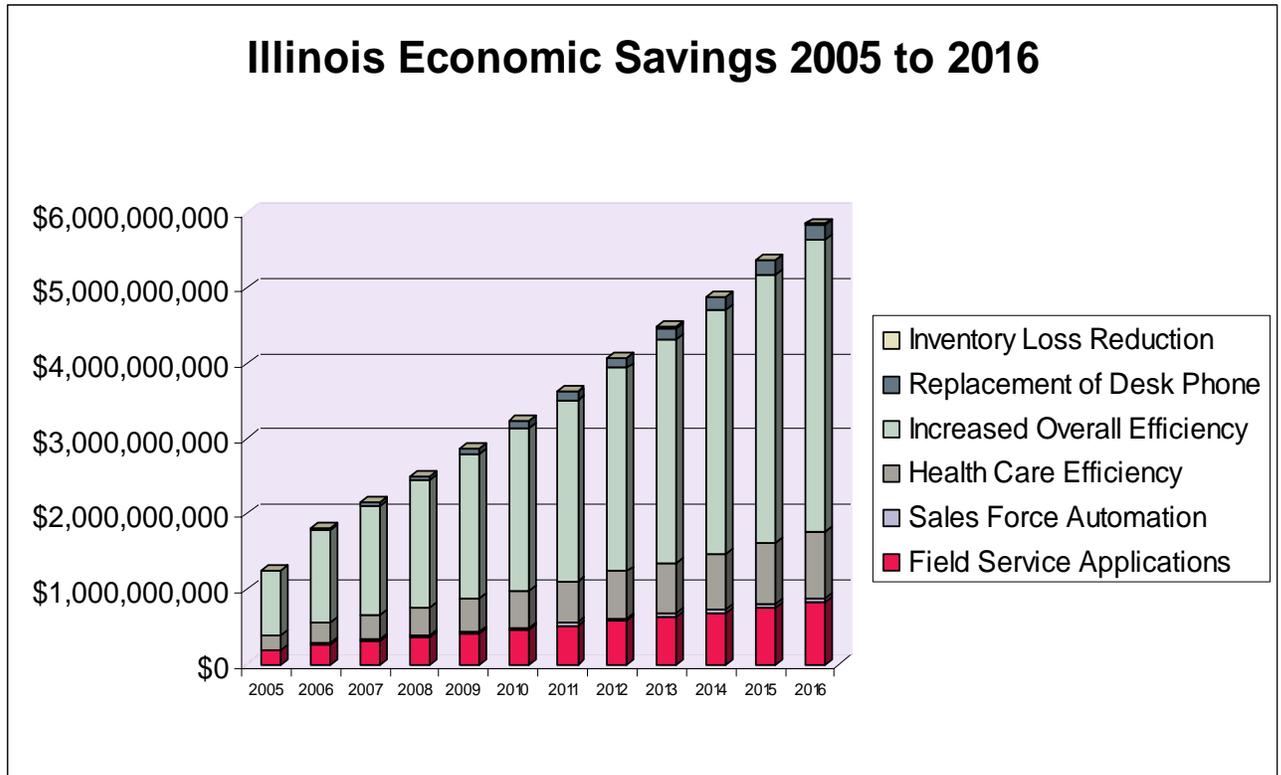
The largest factor in economic savings in Texas is improved efficiency, which generates economic savings that will increase from \$922 million in 2005 to more than \$2.9 billion in 2016. In second place, deploying wireless broadband across the health care industry in Texas will generate savings of more than \$750 million in 2005, which is projected to increase to \$2.4 billion in 2016. The third largest segment of economic savings is in field service applications, where the use of wireless broadband will generate savings rising from almost \$367 million in 2005 to more than \$1.1 billion in 2016. Sales force automation will also generate economic savings, from \$240 million in 2005 to \$764 million in 2016. Enterprise replacement of desk phones with wireless devices yields savings of about \$30 million in 2005, rising to \$256 million in 2016.



## Illinois

The economy of Illinois is another major beneficiary of the adoption of wireless technology. We expect that the economic benefit to the economy of Illinois will increase from \$1.8 billion in 2005 to more than \$5.8 billion in 2016.

Figure 10: Economic Savings in Illinois 2005 to 2016



We expect the use and deployment of wireless broadband technology by Illinois companies to generate economic savings in the amount of \$1.2 billion in 2005 to more than \$3.8 billion in 2016. Health care efficiency gains and field service applications constitute the next largest generators of economic savings, rising from \$277 million in 2005 to over \$880 million in 2016, and \$256 million to \$818 million, respectively. Replacing desk phones, deploying mobile broadband across sales forces, and using mobile broadband to reduce inventory loss is expected to increase savings for Illinois businesses from a combined \$47 million in 2005 to more than \$270 million in 2016.



## 2.5 The scale of additional benefits over the next decade

We estimate that the national and state specific economic benefits generated by the wireless telecom industry through the proliferation and use of wireless broadband services and applications will grow substantially over the next ten years. There are two main effects we can quantify:

- the productivity gains generated by the use of wireless broadband applications across six categories of enterprise activity, and the replacement of desk phones with wireless phones. In 2004, use of wireless broadband applications was in its infancy with total economic benefits of only \$8.5 billion per annum. Only one year later, these benefits already increased to \$31 billion. We estimate that productivity gains from these applications will grow to almost \$79 billion per annum by 2011 and well over \$127 billion by 2016.
- the economic welfare gains from the growth in use of wireless services for voice applications. Projecting forward from current trends using our proprietary Mobile@Ovum forecasts, we continue to expect that the volume of wireless mobile voice calls will grow by over 200%, while prices will drop by nearly 50% over the next five years. This will increase the consumer surplus from wireless voice services to more than the \$263 billion per annum by 2010 as we expected in the original study – an increase of \$106 billion per annum on the 2004 surplus. It is more difficult to project further gains over the following 5 years. But, based on current projections, it would be reasonable to assume that the consumer surplus would reach at least \$300 billion per annum by 2015.

These estimates cover a segment of the additional economic benefits that the US wireless telecom industry will generate over the next 10 years. However, they are by no means complete. The technologies and services discussed in this paper are, again, just the already realized “low hanging fruits” of wireless technology. Over time, just as has happened with the computer industry and the Internet, additional productivity benefits will be uncovered that will enhance the competitive positioning of American businesses even further and increase the benefits discussed in this paper.



## Appendix: Case Studies on Productivity Gains

These examples of business and government users were selected as typical examples of the impact wireless broadband can have on various aspects of business operations of all sizes.

### Sun Microsystems' Field Service Application

In the past, Sun's System Support Engineers received service calls over their pagers and cell phone. These devices did not transmit all necessary information to complete a call with the service alert, which forced the System Support Engineers to call back to Sun's call-management system to get more information or for tasks such as providing a status update.

As early as 2003, Sun decided to improve communications and enhance the productivity of its System Support Engineers by providing them with Palm Treos on Cingular's network in conjunction with software from Asurion Corporation. By standardizing its System Support Engineers on one device and one carrier, Sun was able to reduce the cost to train and support its mobile support force. Further, the new applications give the System Support Engineer all pertinent information that is required to complete the service call without the need to contact the Sun Call Center at all. This enterprise application makes it considerably easier to update the job ticket and close out the call, dramatically reducing the time required. In the past, this burden led many System Support Engineers to delay inputting their reports to the end of the day, which caused numerous input errors and delayed the feeding of data to update service history, billing and other customer and asset information. Now, the system is updated in near real-time.

Sun received many advantages from this change: better service, because the service engineer already knew the nature of the service problem before arriving at the customer's site; more accurate reporting, because the data is now entered while still fresh rather than several hours later; and significant cost savings, because Sun's national call center is now used 52% less frequently. This saves Sun roughly \$275,000 per year. With the new deployment of this wireless broadband solution System Support Engineers now carry only their Treo instead of a laptop computer, pager and phone. The workers recognize the productivity gains; 80% of System Support Engineers rated the new Treo-based solution as "better" than the previous solution.

### Joe Gibbs Racing

Joe Gibbs Racing (JGR) is one of NASCAR's leading racing teams. The team's mechanics and engineers are constantly tweaking and fine-tuning the team's cars to improve the car and race even faster. These efforts generate hundreds of megabytes of data every day that are used to feed a proprietary software simulation that helps JGR drivers to make smarter race-day decision. In the past JGR used a satellite-based solution to manage this data, but that proved to be slow, cumbersome and unreliable. The team then used dial-up with disappointing results. To get this important information to headquarters fast, JGR switched to Sprint Mobile Broadband's EV-DO. Now the information is transmitted faster and more securely due to the inherent security that comes with a CDMA network. JGR crew chiefs can now log into the databases back at the headquarters from any location in the US as they can at their desks in North Carolina. Every car



detail, track condition, and times can be simulated on the high-powered computers at headquarters but monitored on the laptops to determine the optimal setting for upcoming races.

### **GE Home Services**

GE Home Services repairs appliances in residences, apartment complexes, hotels, motels, and retail stores across the United States. In an effort to improve the efficiency of its field services as well as four call centers and 17 dispatch centers, it decided to introduce a field services application provided by Verizon Wireless. The custom solution was deployed in 2005 to a nationwide fleet of more than 1,200 vehicles that respond to more than 10,000 calls a day. Each technician received a Panasonic Toughbook laptop with embedded mobile broadband (EV-DO) primarily using the Verizon Wireless network. The laptop with EV-DO card allows Machine-to-Machine and telemetry applications such as fleet management, asset tracking, security exception reporting, and wireless-enabled point-of-sale transactions. Since the installation of the system, technicians have been able to complete 16% more calls per day. The number of dispatch centers was reduced from 17 to just two, an 88% cost reduction, the number of dispatchers fell by 47% and the number of exception handlers fell by 30%. The number of repairs that were completed in one visit rose to 90%, and the already high level of customer satisfaction grew by three percent. Initially, GE planned to recoup its investment over three years, but in actuality was able to recover its cost in full after only one year.

### **Wake Forest University Mobile Program**

Wake Forest, the first university in the United States to require laptops for its students, has now expanded its technology focus by offering to its students, faculty, and staff the opportunity to participate in a program deploying Cingular Pocket PC 8125 handheld smart phones. Participants are able to access the university's campus portal, from where they can download their schedule into their device as well as check their grades, the library catalogue, campus directory, and bus schedule and receive alerts when a bus arrives at the stop.

### **BMW**

BMW, one of the most recognized brands in the world, has sought new ways to attract new customers to its automobiles. With the launch of its X3 Sports Activity Vehicle, BMW wanted to supplement its traditional TV, radio, and print advertising with kiosks to convert a larger number of interested parties into customers. Kiosks are nothing new to BMW, but previously they were all connected through T-1 lines to the sales center. T-1s are very expensive and take considerable time to install. With the X3 campaign, BMW decided to use Sprint EV-DO data cards that provide more than sufficient speed with the flexibility of a wireless solution at a much lower price. With more than 200 kiosks and a trial period, Sprint was able to provide connectivity at every location BMW requested. In total, the new kiosks have generated over 56,000 leads with the 3 Series models accounting for 8,364 leads in two months.



## **Wound Technology Network**

Wound Technology Network (WTN) is a physician group practice and management company that contracts with managed care providers to bring specialized wound care to doctors' offices, hospitals, skilled nursing facilities, assisted living facilities and private homes. WTN has 50 employees ranging from doctors and nurse practitioners to patient care coordinators who input patient information. As part of its expansion from South Florida to roll out service in Las Vegas and Southern California, WTN wanted to provide anywhere, anytime access for approved parties to patient records, patient treatment visuals, and expert advice. Instead of an ISDN landline solution, WTN installed Verizon EV-DO cards with the appropriate encryption software to be compliant with HIPAA in 50 laptops and added webcams to the devices. The devices now run across a wireless VPN to comply with the encryption requirements of HIPAA. As a result of the implementation, WTN has realized cost savings across 80% of its operations, for between \$30 to \$40 million in total savings.

## **San Diego Public Services**

The City of San Diego is deploying a wireless dispatch service to more than 1,100 trash collection vehicles, saving the people of San Diego more than \$1 million in tax dollars per year. The V-TRAC program developed by the City's Environmental Services Division combines Global Position System (GPS) technology with Cingular's wireless broadband network to improve the time and scheduling of collections of trash and recyclables. San Diego's ESD is responsible for collecting the household waste of approximately 1.26 million people spread over 342 square miles. ESD collects more than 500,000 tons of refuse collected during 29 million stops serving roughly 318,000 customers. The GPS system allows to track the exact location coordinates of every vehicle, its mechanical performance, and vehicle speed. This allows dispatchers to distribute and update work assignments in real time making last-minute adjustments to the route in case a vehicle breaks down or a customer calls in with a request that requires immediate attention. Since the program started in 2001, the City of San Diego has eliminated 50 routes per week, reduced the mileage travelled by refuse trucks by 900 miles a week, and reduced gasoline consumption by about 10,000 gallons per year. At the same time, San Diego has expanded yard waste collection from 150,000 to 200,000 homes, enabling the City to comply with state waste reduction mandates.

## **Federal Aviation Administration and Harris Corporation**

The public expects the FAA and its prime subcontractor, Harris, to resume operations quickly after a natural disaster. Before the devastation caused by Hurricane Katrina, Harris integrated Sprint's EV-DO network as the connectivity solution in the case of a natural disaster. The Sprint mobile broadband solution allowed the FAA to maintain critical communications and continue to guide essential aid flights arriving in New Orleans.

## **Ecast delivers on Jukeboxes**

Ecast delivers on-demand music to 7,500 jukeboxes in bars and restaurants and bars in the United States, with over 42 million listeners per month. Ecast's customers are 1,200 operators who own and service every box on the network. While many jukeboxes have been connected to the Internet through a leased landline, this made it made it difficult for Ecast to receive discounts



or to improve service because of the fragmented nature of the lease line market. In March 2006, Ecast started its first trial with Verizon EV-DO cards using 25 units, quickly followed by another 20 test units. Ecast now has 500 wireless units and anticipates rolling out 3,000 units over the next year. Previously, one had to wait for broadband to be connected to the bar and jukebox. Now once the jukebox is placed, it is fully operational. This will enable Ecast to increase deployment from 400-500 units per month currently to about 700-800 units. The accelerated time to launch a unit also generates more revenue; in the past, units have stood idle for several weeks before being hooked up to the Internet. With the new system, Ecast had no service calls associated with the first 45 units in more than four months, which reduced the need for support. In addition, if a restaurant jukebox does not generate sufficient revenue, the usual \$200 early termination fee from the wired Internet provider does not apply because the wireless card simply moves with the unit.

### **Ft. Hood Army Police**

Ft. Hood, Texas, is the largest US military installation with more than 90,000 people living on base and between 150,000 and 200,000 soldiers and civilians entering the base every day. More than 300 military and civilian police officers provide law enforcement services to the base and its inhabitants. Ft. Hood's Police recognized that its old radio system was no longer addressing today's demands. The old system featured cross-traffic and was often intercepted by the public. In addition, the old system could not determine where officers were located at any given time, but relied on the officers volunteering their location. A police officer arrived at a scene with only sketchy information regarding the situation, and dispatchers frequently provided the wrong information. During traffic stops police officers had to relay information over the radio to check State and Federal databases. This not only lengthened the traffic stop but also endangered the police officer. Beginning in 2002, Ft. Hood Department of Army Police conceptualized a solution and picked Cingular to be its provider. All patrol cars received a rugged laptop that was wirelessly connected to the dispatch office and to all necessary State and Federal databases. Soon the system was also connected to the Housing Roster of the post as well as the Weapons List, which permitted officers to know if there is a weapon in a house before entering. Now police officers are constantly tracked and kept informed about the situation they will encounter on a call. After the call, the officer can immediately enter a report that relies on fresh information rather than having to remember information several hours later after the officer has to returned to the station. The new system is so successful that the response time for emergency calls has been reduced from 3-5 minutes to 1-2 minutes and the non-emergency response time from 8-10 minutes to 3-5 minutes. After the dramatic improvements in the police department, the Ft. Hood Fire Department is also working on implementing the same system.

### **Verde Valley Guidance Clinic**

Verde Valley Guidance Clinic (VVGW) provides outpatient mental health and substance abuse services to Cottonwood, Sedona and Camp Verde, Arizona. VVGW wanted to enable more effective and efficient field treatment by mobilizing its electronic records. Because of the sensitive nature of VVGW's work, many patients prefer to be seen not in an office setting but rather in a non-clinical environment. In addition, VVGW just had received funding to hire 20 new people but did not have office space for them. Initially VVGW provided 15 shared Panasonic hardened



laptops with Verizon EV-DO cards to over 30 employees to enable them to log into the VVGC back office via a virtual private network to satisfy the Federal requirements on privacy of health information. The entire deployment was completed within 60 days of signature on the contract. VVGC estimates that the initial deployments will produce cost savings of \$108,000 over six years. For 2006, alone VVGC projects savings of \$76,000 with continued, but declining, gains over the next six years, with full recovery of its investment within 3 years. Higher employee morale with the new system has led to the lowest employee turnover rate in the history of the company.

### **Adidas Sales Force Automation**

The international sportswear provider Adidas realized that it would be able to streamline the sales process by adding applications beyond email to the Blackberries its 200 sales representatives were already using on Cingular's network. Adidas wanted to reduce the number of calls from sales representatives in the field to check product availability using their own phone or a phone borrowed from the customer. To enhance professionalism and accelerate sales momentum, Adidas internally developed Atlas2Go, a sales force automation application. Atlas2Go allows sales representatives to log into Adidas' SAP databases using their Blackberry system and check inventory in real time. This allows sales personnel to write orders on the spot without the possibility of promising customers products that are not in inventory. Adidas performs over 120 wireless queries a day and had to spend less than \$10,000 to develop its own software application. Adidas states that it took only one order to pay for its investment.

### **Shands HealthCare**

Shands HealthCare is comprised of nine not-for-profit teaching hospitals, a network of more than 80 primary and specialty practices, and a medical staff of more than 1,500 University of Florida faculty and community physicians and 12,000 employees in Florida. Shands recognized that it needed to increase the speed and effectiveness of communications to better service over one million patients per year who use its facilities. Shands asked Sprint to install a campus-wide wireless network that allows all employees to receive text messages instead of being paged. Furthermore, walkie-talkie capabilities enable doctors, nurses and other employees to be in touch instantaneously. These improvements led to an increase in the level of service and employee job satisfaction. The solution was so comprehensive that the handsets also work in elevators.

### **TaylorMade Sales Force Automation**

TaylorMade, the golf club, clothing and accessories company, realized that it could dramatically improve its supply chain management practices by rolling out sales force automation software to its field sales force. Up to 60% of the time the salesperson previously spent in a customer's store was spent on the phone checking inventory rather than actually selling. TaylorMade rolled out Pocket PC handhelds operating on Cingular's wireless network that expedited inventory checking and the entire sales entry and order process. Furthermore, the attached barcode reader could quickly check the in-store inventory level and synchronize it with TaylorMade's backend software. TaylorMade's shipping, billing, and manufacturing departments rely on the information dispensed and collected through the sales force automation software. Since the introduction of the system



sales volume has increased by 15% per sales representative and 10-20% per customer order. The increase in sales calls that each sales representative is now performing equals an increase of 25 sales representatives. In addition, inventory time has been reduced by 75%, sales forecasting has improved, and customer satisfaction has increased.

### **Avis**

Avis, the car rental company, turned to what was then Cingular to update its Wizard on Wheels (WOW) preferred customer reservation application. WOW provides for the express check-in and preparation of the customer's rental car. During the bus ride from an airport terminal to the rental location, the bus driver requests the customer's name, which is transmitted over the wireless network. The WOW application server checks the customer reservation database and sends a notification to the Avis lot. This allows the lot to prepare the car and display to the customer the moment she steps off the bus the parking spot in which the assigned car is located and the make and model of the car. This application improves customer satisfaction and retention.

### **US Navy**

The Navy Marine Corps Intranet (NMCI) is the world's largest and most secure private network. NMCI currently has 700,000 users and has gained about 70,000 people per year over the last six years; it is expected to have more than a million users in the near future. The Navy wanted its intranet users to be truly mobile and more productive without having to rely on fixed communications and the associated cost of ad hoc communications. The Navy provided its mobile users Dell laptops with Kyocera EV-DO cards on the Verizon Wireless network using a Juniper VPN. The cost savings for the Navy have been tremendous. More than 2,000 people are travelling every month with hotel charges averaging more than \$12.95 per day for broadband access. If the Navy personnel travelled just one week per month, the Navy broke even on the cost of the wireless access using Verizon's network. In the wake of Hurricane Katrina, when the Navy had more than 700 displaced personnel, the wireless connectivity was invaluable. During a recent Flag Officer Conference with 300 attendees, many senior officers commented that the mobile solution was a huge benefit to them.

### **Zipcar**

Zipcar, the car sharing company, works with AT&T Mobility to wirelessly connect to every Zipcar and allow customers to reserve a car online. Once a car is reserved, a system in the car is implemented to indicate which Zipcard is authorized to use the car. Through the GPS module in the car, this online tool lets customers check which cars are in the vicinity. When members go to the location of the car they have reserved and hold a Zipcard to the Zipcar decal the car authenticates the customer and allows the doors to be opened and the ignition to be started. At the end of the trip, usage information is transmitted back to the system and the customer is charged. Zipcar can remotely monitor miles driven, the time the car was used and check the status of the engine and fuel levels. It even can tell if a customer has left the car headlights on and send a Zipcar maintenance person to turn off the light before it runs the battery down for the next customer.



## **Best Buy**

Best Buy has more than 940 retail stores across the US and Canada selling consumer electronics, home-office products, entertainment software and appliances. In addition, it has 12,000 Geek Squad agents who service computers and 1,600 home theatre installers. Best Buy sought to differentiate itself from other retailers through superior service by its Geek Squad agents and home theatre installers. For its home installers, Best Buy wanted remote connectivity with its enterprise network, vendor web data and sites for downloading firmware, manuals and installation guides. Geek Squad agents received GPS turn-by-turn voice directions to allow Geek Squad mission control to track the location and improve safety and productivity. The goal was to increase the number of visits by 1.5 per day per agent. Best Buy provided its Geek Squad employees with V6700 smart phones with Windows Mobile 5.0 and its home theatre installers laptops with EV-DO data cards. It took only 60 days to deploy all 18,000 units to its employees. Best Buy met and exceeded its financial goals using this new system. Not only are Geek Squad employees conducting 1.5 more visits per day, but they also use the GPS system to locate the lowest cost gas stations to refill their vehicles.