Trends and Developments in Wireless Data Applications

Focus Report

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Chapter 1
Executive Summary

Study Objectives

This study identifies trends and developments in the United States for the mobile data applications market and develops a five-year forecast.

Specifically, the study is designed to examine the following aspects of the North American mobile data market:

- To break down the market of mobile workers who will be using wireless data applications
- Demand drivers for individual wireless data applications
- Five-year mobile data market forecasts for mobile data subscribers and revenue by wireless data applications, looking at three major groups of wireless applications: business vertical, business horizontal and personal

Scope

The wireless data subscribers and revenue by application are for wireless WAN services, which include circuit-switched and packet-switched wireless data services offered over public WANs, two-way SMS, and services offered over major packet-switched and two-way paging networks, such as DataTAC, Mobitex and ReFLEX. This report does not address the following network types:

- One-way paging
- One-way SMS
- Private data networks
- WLANs (public or private)
- Bluetooth access to a landline connection
- Satellite-based data networks

Methodology

This report is based on primary and secondary research conducted by analysts assigned to the North American wireless market. The secondary research consisted of analyzing published company literature and product specifications, as well as articles appearing in leading magazines. In addition, information was extracted from Gartner Dataquest's in-house data sources and Gartner Dataquest reports. Moreover, the knowledge base and insights of the other analysts and consultants in the Gartner Dataquest wireless programs contributed to this report.

While the secondary research was used as background information, the study's findings are based on primary research. This research was performed by interviewing senior executives in companies that manufacture and market wireless data equipment. In addition, senior executives in companies that provide wireless data services were interviewed. Those interviewed came from a wide spectrum of disciplines, such as marketing, finance and engineering. The report's authors attended major trade shows and conferences, obtaining first-hand information on the activities of wireless data equipment manufacturers and service providers.

The purpose of gathering information from a diverse range of sources was to crosscheck information to ensure accuracy and to base the findings of the study on the knowledge base of a wide range of participants.

Gartner Dataquest defines wireless data subscribers as those who use wireless data services at least twice a month or who pay a monthly fee for wireless data services.

Summary of Key Findings and Highlights

This report's key findings are summarized as follows:

- Messaging will be the key driver for wireless data over the next five years. Messaging from the business and the personal side will account for 48 percent of all wireless data revenue in 2005.
- Business users will continue to drive the market and contribute a higher percentage of total revenue than the consumer users until 2005, when personal (consumer) revenue will surpass business revenue.
- Vertical business wireless data revenue will grow from $278.7 million in 2000 to $894.6 million in 2005 for a CAGR of 26.27 percent. The vertical market will be led by banking and trading, professional services, and utility users.
- Other fast-growing vertical applications identified include insurance, retail and construction.
- Horizontal business wireless data revenue will grow from $653.6 million in 2000 to $7.14 billion in 2005 for a CAGR of 61.32 percent. The group will be led by e-mail / calendar / PIM, messaging, field service and sales automation / inventory.
- Other fast-growing horizontal applications include enterprise resource management, digital photography and corporate legacy / file transfer.
- Personal wireless data revenue will grow from $127 million in 2000 to $10.6 billion in 2005 for a CAGR of 142.37 percent. The group will be led by messaging, information services, location services, entertainment, games and e-mail / calendar / PIM.
- Other fast-growing personal applications include advertising, m-commerce customer service, digital photography and financial services.

Chapter 2
Mobile Worker Breakdown

Mobile Workers

Gartner Dataquest estimates that there are 59.8 million mobile workers in the United States. A mobile worker is a worker who is away from the office or desk more than 20 percent of the time, has a job with no desk or office, or who must perform work that requires mobile communications. Gartner Dataquest has divided the mobile workforce into architecture and engineering; IT systems; healthcare; education; legal; writers, artists, entertainers and athletes; field service; transportation, general executives, finance, sales, utilities and public safety; hospitality; construction; farming, forestry and fishing; and government services, real estate, and oil and gas exploration.

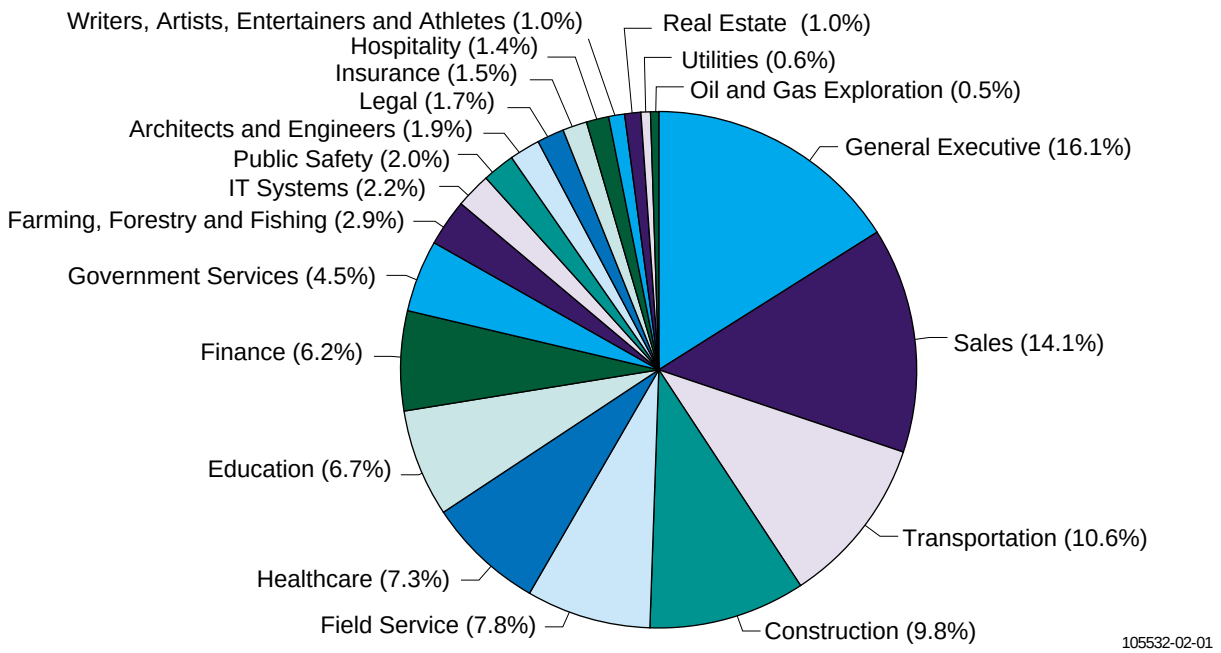
The breakdown of mobile workers by category is shown in Table 2-1 and Figure 2-1. The leading mobile worker categories include general executives, sales, transportation, construction, field service, healthcare, finance and education. This top category makes up 78 percent of the total mobile workforce. The degree to which wide-area wireless application will improve the efficiency of these workers and their organizations will depend on the size of the work area (in buildings, on campuses, or inter-city, inter-regional, nationwide, or international), the urgency of communications, the workflow processes of the organization, and the individual's need to receive and send information.

Table 2-1
Breakdown of Mobile Workers by Type in the United States, 2001 (Thousands of Workers)

Industry	Number of Mobile Workers	Percentage of Total
Oil and Gas Exploration	270.48	0.46
Utilities	400.00	0.67
Hospitality	830.40	1.40
Insurance	872.00	1.47
Writers, Artists, Entertainers and Athletes	882.70	1.49
Real Estate	577.00	0.97
Legal	986.05	1.66
Architects and Engineers	1,137.50	1.91
Public Safety	1,216.80	2.05
IT Systems	1,291.60	2.17
Farming, Forestry and Fishing	1,718.00	2.89
Government Services	2,701.10	4.55
Education	3,958.45	6.66
Finance	3,687.00	6.20
Healthcare	4,416.00	7.43
Field Service	4,607.20	7.75
Construction	5,801.00	9.76
Transportation	6,253.00	10.52
Sales	8,326.80	14.01
General Executive	9,487.20	15.97
Total	**59,420.28**	**100.00**

Source: Gartner Dataquest (April 2002)

Figure 2-1
Breakdown of Mobile Workers in the United States by Category, 2001



Source: Gartner Dataquest (April 2002)

The categories included the following occupations:

- The architects and engineers category includes architects and aerospace, chemical, civil, electronic and electric, industrial, and mechanical engineers.
- The IT systems category includes mathematical and computer scientists, computer systems analysts, operation and systems researchers, computer programmers, and computer equipment operators.
- The healthcare category includes managers of medicine and health, biological and life scientists, physicians, dentists, registered nurses, dietitians, respiratory therapists, physical therapists, psychologists, health technologists and technicians, licensed practical nurses, and biological and chemical science technicians.
- The education category includes college and university teachers, teachers of kindergarten through 12th grade, secondary and special schoolteachers, recreational workers, and school administrators.
- The legal category includes lawyers, judges and legal assistants.
- The writers, artists, entertainers and athletes category includes authors, technical writers, musicians and composers, actors and directors, painters, sculptors, crafts artists, artist printmakers, photographers, editors and reporters, public relations specialists, announcers, and athletes.
- The field service category includes mechanics and repairers, HVAC, plumbers, electrical and electronic equipment repairers, data processing equipment repairers, and telephone installers and repairers.
- The transportation category includes motor vehicle operators, truck drivers, material moving equipment, industrial truck and tractor operators, public transportation attendants, mail carriers (postal service), messengers, and airline pilots, navigators and attendants.

- The general executives category includes executives, administrators, managers consultants, officials, financial managers, personal and labor managers, purchasing managers, marketing, advertising and public relations managers, and management-related occupations.
- The finance category includes bankers and bank employees, security and commodity brokers, traders, accountants and auditors, bookkeepers, accounting and auditing clerks, investigators and adjusters (noninsurance), and mortgage banking and brokers.
- The sales category includes general sales, financial and business services sales, insurance sales, real estate sales, security and financial services sales, advertising sales, and commodity sales.
- The utilities category includes meter readers and utility service personnel.
- The public safety category includes federal law enforcement agencies, police and detectives, sheriffs, bailiffs and other law enforcement offices, correctional institution officers, and firefighters and fire prevention workers.
- The hospitality category includes hotel and motel managers, hotel and motel employees, and maids and housemen.
- The construction category includes construction trades, carpenters, and construction supervisors.
- The farming, forestry and fishing category includes farm operators and managers, agriculture and related occupations, farm workers, forestry and logging operations, and fishers, hunters and trappers.
- The government services category includes workers from the executive and legislative branches of the federal government and workers in state and local government (excluding law enforcement and firefighters).
- The real estate category includes managers of properties and Realtors.
- The oil and gas exploration category includes workers and managers of oil and gas exploration companies.

The category breakdowns were determined via U.S. Census statistics, U.S. Department of Labor statistics, Gartner G2 statistics on wireless usage by occupation and industry, and interviews with various software solutions providers.

Chapter 3
Vertical Business Applications

Gartner Dataquest has broken down the vertical business applications market into: public safety, government (excluding public safety), insurance, healthcare, banking and trading, real estate, utilities, manufacturing/construction, professional Services (legal, consulting, market research and IT), and retail market groups.

The subscribers for these various vertical applications are shown in Table 3-1 and Figure 3-1. The leading subscriber groups in 2000 were banking and trading, utilities, and public safety. In 2005, banking and trading is expected to have the most subscribers (1.1 million subscribers) followed by professional services (500,000 subscribers) and retail (350,000 subscribers). The fastest-growing subscriber groups between 2000 and 2005 are expected to be professional services, manufacturing and construction, and insurance.

The revenue for the various vertical applications is shown in Table 3-2 and Figure 3-2. The leading revenue groups by application in 2000 were banking and trading, utilities, and public safety. In 2005, banking and trading had the largest revenue contribution at $480 million, followed by professional services at $115 million and utilities at $80 million. The fastest-growing vertical markets in terms of revenue between 2000 and 2005 are expected to be manufacturing and construction, insurance and professional services.

Following are breakdowns and descriptions of the various vertical markets. These breakdowns will outline the success factors for the vertical wireless data markets that have been identified.

Public Safety

Public safety has long been a wireless success story, with early trunked radio and CBs enabling law enforcement and fire and rescue services to respond and coordinate quickly. Wireless data has also historically played a role in law enforcement and now in fire and rescue to serve the same purposes as wireless voice; it offers better coordination and better communications. Law enforcement uses wireless data to increase communications, issue violations and for database lookup and license/warrant checking. Fire and rescue use it to request additional personnel and report status of emergencies and patients. One major impediment to further utilization of wireless data in the public safety area is the use of licensed spectrum and the limited coverage/speeds that can be achieved with private network, which is currently used by most public safety personnel. This will change as more public safety personnel start to look toward the public network because of the higher speeds and, in many cases, better coverage. In fact, we are beginning to witness the implementation of CDPD for police for looking up records on traffic stops and imputing records of motorist for parking meter violations. Gartner Dataquest expects that with 2.5G and 3G systems, in concert with the roll out of location-based technologies, public safety users will turn to public networks and away from privately operated licensed networks.

Table 3-1
Vertical Market Wireless Data Subscribers in the United States, 2000-2005

	2000	2001	2002	2003	2004	2005	CAGR (%) 2000-2005
Public Safety (Police, Fire)	100,000	115,000	132,250	152,088	174,901	201,136	15.00
Government (Excluding Public Safety)	0	0	5,000	10,000	20,000	40,000	NA
Insurance	5,000	10,000	20,000	40,000	70,000	120,000	88.82
Healthcare	20,000	30,000	34,500	39,675	100,000	150,000	49.63
Banking and Trading	400,000	490,000	550,000	700,000	900,000	1,100,000	22.42
Real Estate	2,000	2,500	3,000	5,000	10,000	20,000	58.49
Utilities	100,000	125,000	150,000	160,000	165,000	170,000	11.20
Manufacturing / Construction	5,000	10,000	20,000	40,000	100,000	170,000	102.44
Professional Services (Legal, Consulting, Market Research and IT)	10,000	30,000	70,000	150,000	300,000	500,000	118.67
Retail	30,000	60,000	100,000	170,000	250,000	350,000	63.45
Total	**672,000**	**872,500**	**1,084,750**	**1,466,763**	**2,089,901**	**2,821,136**	**33.23**

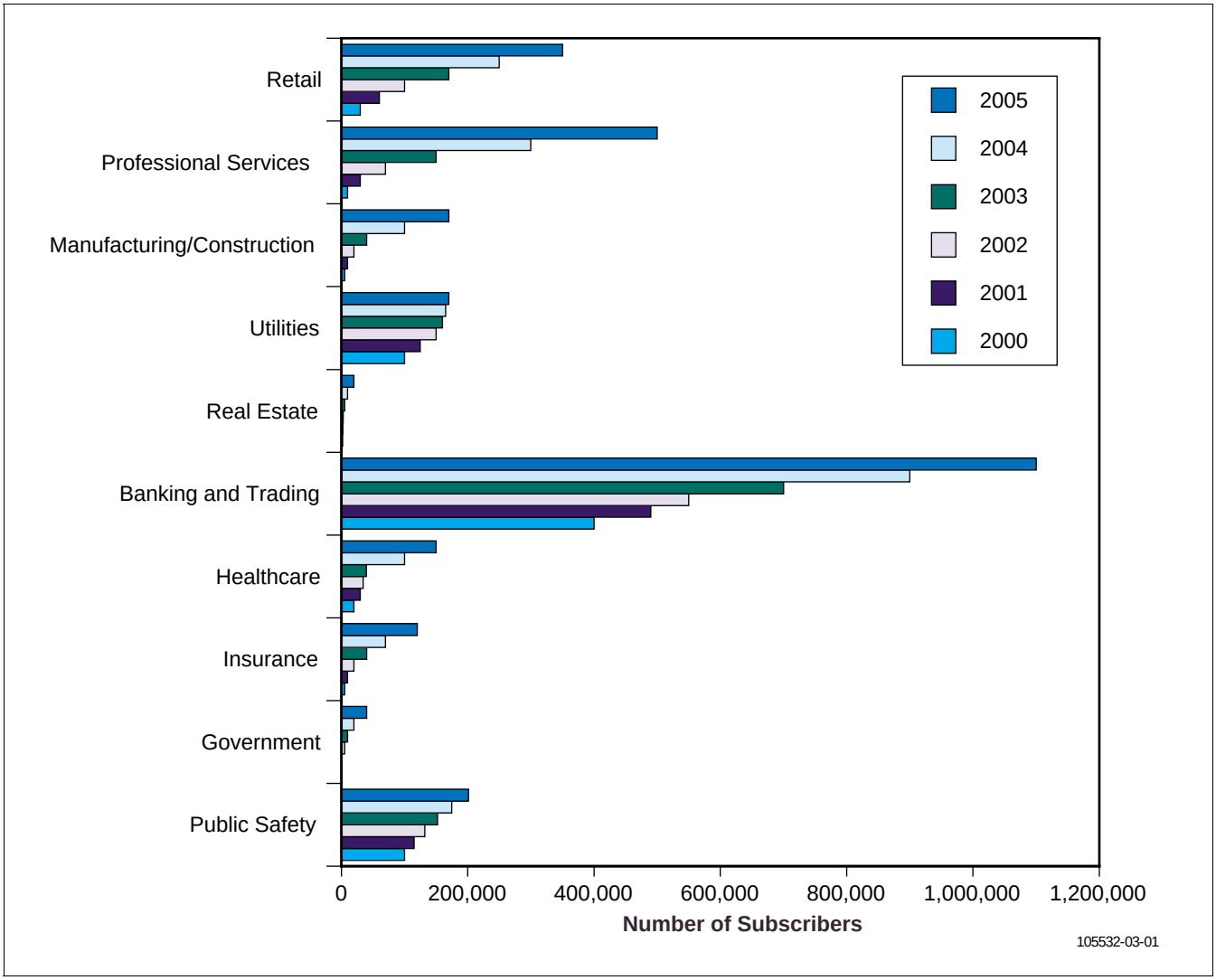
Source: Gartner Dataquest (April 2002)

Table 3-2
Vertical Business Market Wireless Data Revenue in the United States, 2000-2005 (U.S. Dollars)

	2000	2001	2002	2003	2004	2005	CAGR (%) 2000-2005
Public Safety (Police, Fire)	43,200,000	49,020,000	51,922,500	54,592,800	54,934,005	56,405,452	5.48
Government (Excluding Public Safety)	0	0	450,000	1,260,000	2,160,000	3,600,000	NA
Insurance	1,200,000	3,600,000	7,200,000	14,400,000	25,080,000	41,040,000	102.68
Healthcare	3,150,000	7,500,000	9,675,000	11,126,250	20,951,250	37,500,000	64.11
Banking and Trading	150,000,000	256,320,000	287,040,000	330,000,000	403,200,000	480,000,000	26.19
Real Estate	240,000	540,000	660,000	864,000	1,350,000	2,160,000	55.18
Utilities	71,400,000	94,500,000	115,500,000	111,600,000	97,500,000	80,400,000	2.40
Manufacturing / Construction	540,000	1,350,000	2,700,000	5,400,000	12,600,000	24,300,000	114.11
Professional Services (Legal, Consulting, Market Research and IT)	4,800,000	8,400,000	18,000,000	36,960,000	70,200,000	115,200,000	88.82
Retail	4,200,000	9,450,000	16,320,000	26,730,000	39,060,000	54,000,000	66.66
Total	**278,730,000**	**430,680,000**	**509,467,500**	**592,933,050**	**727,035,255**	**894,605,452**	**26.27**

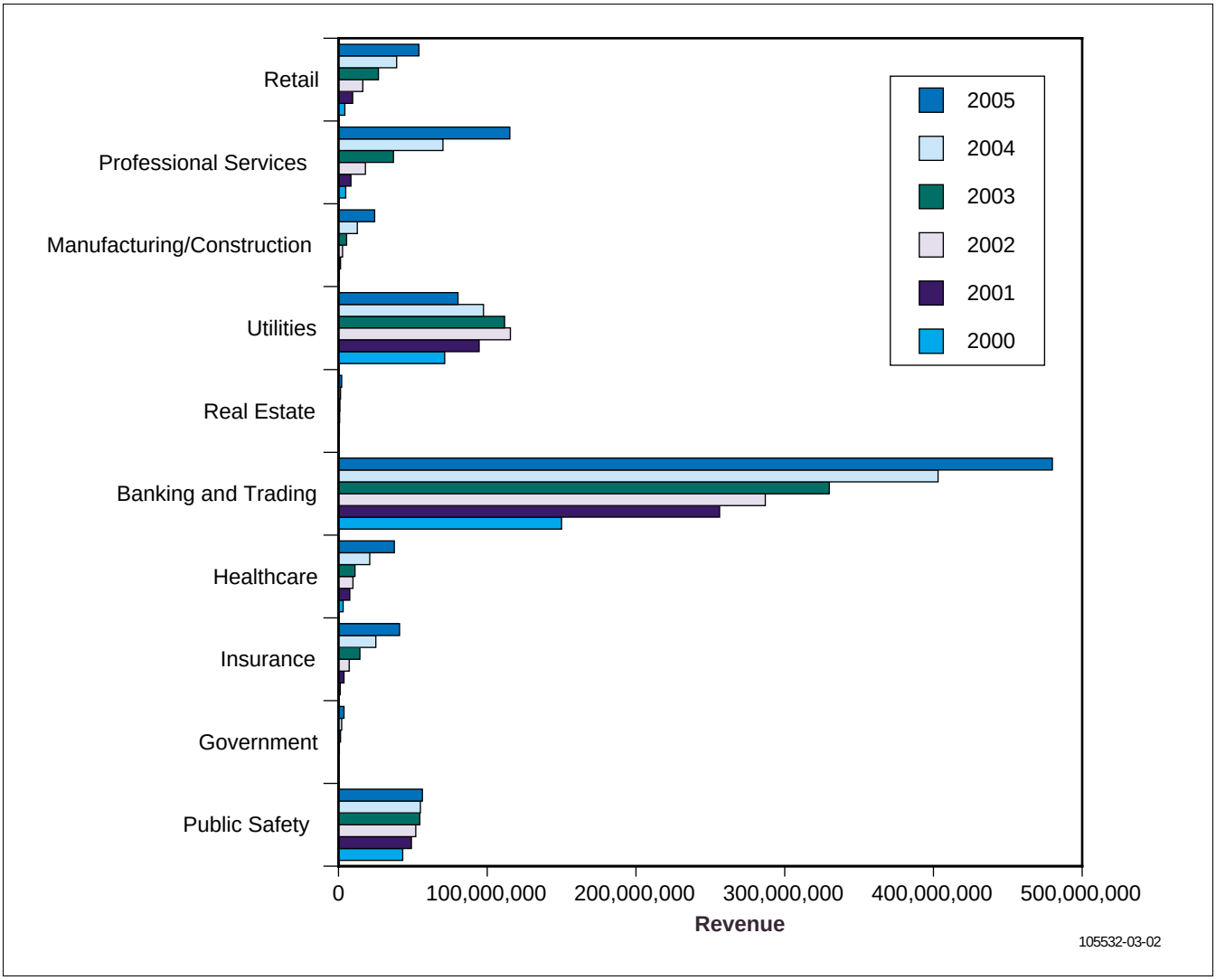
Source: Gartner Dataquest (April 2002)

Figure 3-1
Vertical Business Market Wireless Data Subscribers in the United States, 2000-2005



Source: Gartner Dataquest (April 2002)

Figure 3-2
Vertical Market Wireless Data Revenue in the United States, 2000-2005



Source: Gartner Dataquest (April 2002)

However, this migration will take time, as laws around utilization of public networks, concerns of availability and quality of service all must be addressed before public networks can be considered a viable replacement for existing private networks. Additionally, because of the longer depreciation periods under which the usual public safety equipment is purchased, the obsolescence of existing equipment will take some time.

Once the critical mass builds and coverage for wireless data improves, we expect ARPUs to come down as a result of more choices in the market. Long the purview of large consulting firms and very specialized boutiques, the public safety space is a growing base for a wider assortment of vendors. Applications vendors are beginning to examine this space more closely, as users look for more off-the-shelf applications and devices. Lastly, Gartner Dataquest expects to see some combination of public safety/consumer-based systems/applications, such as traffic reporting by CalTans and private corporations then messaging the results to wireless devices.

Gartner Dataquest estimates the market for public safety-specific wireless application service revenue to be $519,000 in 2002, growing to over $56 million in 2005 (see Table 3-3).

Table 3-3
Public Safety Revenue in the United States, 2000-2005

	2000	2001	2002	2003	2004	2005
Revenue ($)	43,200,000	49,020,000	51,922,500	54,592,800	54,934,005	56,405,452

Source: Gartner Dataquest (April 2002)

Government

Most of the government usage of wireless data has been limited to generic applications such as e-mail and messaging — and these are rarely even supported outside the departmental level. However, as the wireless data market grows and the menu of applications and services grows, Gartner Dataquest expects the development of additional industry-specific applications focused on areas such as government purchasing, GSA scheduled maintenance and inventory applications. Other potential wireless vertical applications for government include accessing government records, maintenance and distribution of public records, and wireless-enabled status reports and filings.

Overall, Gartner Dataquest does not expect a large quantity of industry-specific government applications; rather, most government entities will use horizontal business applications to fulfill their wireless and remote application needs. Lastly, we believe that ARPUs will remain relatively low for the majority of these applications because they will often be sold as a part of a much larger bundled package.

Insurance

Most of the wireless traction in the insurance industry so far has been with claims adjusters and other mobile employees. Some of the benefits that wireless brings to the claims work process is that it allows adjusters to stay on the road and out of the office, where they may be less productive. But the big cost savings lies in the fact that that the claim is touched only once in the adjustment process. This speeds up the process, improving customer satisfaction, and lowers the labor cost on the back-end. Other uses for wireless services include being able to take photographs on the spot and send them back wirelessly to be evaluated. Two of the companies identified as leaders in this area are IBM and Sprint PCS.

Gartner Dataquest estimates that the total addressable market for mobile workers using insurance applications at year-end 2001 was approximately 500,000. Of that addressable market, Gartner Dataquest estimates that 10,000 used wireless insurance applications in 2001. That number is expected to grow to 120,000 in 2005 for a CAGR of 88.82 percent between 2000 and 2005. The revenue for wireless insurance applications is expected to grow from $3.6 million in 2001 to $41 million in 2005, for a CAGR of 102.68 percent between 2000 and 2005.

The uptake in the insurance area will depend on the ROI that can be justified. One area that has not shown success in the insurance area is the B2C component. In many cases, it is easier to pick up a phone rather that gain information via a wireless device. This may change as the wireless user interface improves. Another potential area of growth is on the spot claims information for salespeople trying to close a deal with a customer. This application has been used in somewhat, but at present the ROI to justify the investment vis-à-vis doing the calculations at the office and bringing them to the customer site has not prompted widespread adoption.

Healthcare

Gartner Dataquest estimates that the total size of the U.S. healthcare industry is 9 million employees. Many of these employees are working at different stations (for example, nurses in a hospital), at a few different locations (for example, physicians at the office and the hospital) and at many different locations (for example, home health nurses). There are several basic needs for mobility in the healthcare industry, including:

- Alerts on a patient's condition
- Prescription ordering
- Access to patients' records and lab reports
- Dictation / speech recognition / transcription
- Charge capture

The needs of the medical employees working at different stations have been served in part by WLAN technology. A number of hospitals are using WLANs to order medications and update and gain access to patients' records, and access to lab reports. Medical employees working at different locations outside the hospital often use WAN technology for a number of benefits. This market has been traditionally served by paging because of the wider coverage characteristics of paging networks, and this will continue. There is, however, the possibility that these paging services will be shifted to other WANs when there are sufficient improvements in wide-area coverage and in-building coverage, a they will possibly be bundled with a number of other medical services.

Some of the factors holding back the implementation of wireless devices include:

- The cost of healthcare applications vs. the expected ROI
- Coverage of the WLAN and WAN networks from an in-building and overall network coverage perspective
- Security concerns about storing and transmitting patient information
- Lack of wireless solutions from large, back-office healthcare application vendors, which can fully utilize wireless by tying together a number of different databases such as patient records, pharmaceutical inventory and so on
- Lack of a large number of wireless case studies in the healthcare industry
- The cost of wireless service

Wireless application adoption has not been strong in the healthcare market to date. Gartner Dataquest expects this to change somewhat, although not by any large number, over the next couple of years as the overall cost of wireless decreases and the healthcare providers look to gain greater efficiencies by improving the responsiveness of their doctors and nurses.

Gartner Dataquest expects that the number of healthcare employees using wide-area wireless network healthcare applications will grow from 30,000 in 2001 to 150,000 in 2005 for a CAGR of 49.63 percent. The majority of these healthcare employees using wireless services will be physicians, nurses and home healthcare workers. The main impetus for using wireless will be responsiveness, as well as recorded accountability for actions. Service provider revenue from wireless healthcare applications is expected to grow from $7.5 million in 2000 to $37.5 million in 2005 for a CAGR of 64.11 percent.

The healthcare employee using wireless will most likely be working in two different environments: the WLAN environment, which prohibits cellular transmission, and the WAN. Attractive services to these employees may require them to communicate in different environments on the same device. This appears to be a market segment where carriers can offer a wireless LAN / WAN solution.

Other promising applications for the healthcare industry include medical administration and remote medical monitoring. Medical administration is a WLAN application, but could be tied into a complete WLAN / WAN solution. With medical administration, the patient, the healthcare worker and the medicine provider are bar coded to ensure the medicine's proper delivery to the patient, that the correct healthcare employee administers the medicine and that inventory control over the medicine is maintained.

Another promising application, which perhaps fits closer into the telematics area, is remote medical monitoring. For example, a patient can wear a shirt or attached device that takes various medical readings and can alert the proper healthcare employee wirelessly if that patient requires attention.

Banking and Trading

According to the U.S. Census, there are four occupation categories within the banking and trading vertical: financial managers, purchasing managers, securities and financial services sales. These groups utilize a number of vertically focused banking and trading applications, mostly related to rapid or current delivery of pricing information (rates) and trading. Thus far, this group has been an early adopter of wireless data because of the importance of accuracy and the immediacy and timelines of trading information for the purpose of decision making. Trials are under way for other applications to assist purchasing managers and loan officers access to banking records and rates while on the road or out of the office. Some of the leading vendors in the space are Aether, 724 Solutions and RIM, all of which have seen moderate success with these trials and some limited-production rollouts. The next step for these and other application vendors in this space is to build applications and models that can rapidly generate ROI and extend beyond the current groups of users (for example, wire transfer and trading), while maintaining a strong security focus. At this point, Gartner Dataquest believes that security is the No. 1 impediment to wireless application adoption within the financial and banking vertical.

As expected, the security vendors are stepping up to the plate with device and application partnerships; however, the mobile security market is still quite immature and will experience a good deal of consolidation and fallout over the next few years. Users are looking for security and authentication methods that link well with existing security methods and policies.

Our estimate for banking and trading users is $1.5 million in service revenue. Gartner Dataquest believes that this will be a high-growth application area, rising to 1.1 million users by 2005 and producing an estimated $480 million in service revenue (see Table 3-4).

Table 3-4
Banking and Trading Revenue in the United States, 2000-2005

	2000	2001	2002	2003	2004	2005
Revenue ($)	150,000,000	256,320,000	287,040,000	330,000,000	403,200,000	480,000,000

Source: Gartner Dataquest (April 2002)

Real Estate

To date, this has not been a large base of mobile data users. However, because of the mobility of the real estate worker and the widespread adoption of mobile voice among this user base, Gartner Dataquest believes that this application category is primed for growth. Some limited trials have been undertaken, but the combination of high device cost coupled with disappointing download access times and poor coverage have affected adoption negatively. The market is extremely price-sensitive and somewhat technology-adverse, so application vendors interested in gaining market in this space must offer all-in-one application, device and connective packages and price them aggressively. Efficiency gained from reducing return office trips obviating the need to be in the office to tie in back-office systems (MLS registries) must be balanced with the frugality of the real estate dealers and the real world coverage/speed realities of today's networks.

There are 1,349 real estate managers and salespeople in United States. Gartner Dataquest believes that the majority (80 percent) of them use some form of mobile communications; this provides a significant opportunity for the mobile operators to mine their customers base. By 2005, we expect that most will qualify as mobile data users, and those users will produce an estimated $2.2 million in service revenue on a yearly basis (see Table 3-5).

Table 3-5
Real Estate Revenue in the United States, 2000-2005

	2000	2001	2002	2003	2004	2005
Revenue ($)	240,000	540,000	660,000	864,000	1,350,000	2,160,000

Source: Gartner Dataquest (April 2002)

Utilities

The utility market has long been a vertical success story for wireless data, with an estimated 50 percent of the field workers in the utility industry using some form of wireless data. That this market has been targeted well by application vendors and network providers, in concert with vertically focused applications and rapid ROI has made utilities one of the bright points in the wireless data world. Application vendors such as MDSI have long been a fixture in the market for utility-focused wireless applications — field service in particular. They have had some limited success in expanding beyond the field service side of the business, but the majority of the users in this space remain in that domain.

Gartner Dataquest expects that this market will continue to grow in revenue and users as the complexity and verity of the applications grow, as high-speed data services further enable existing applications, and as new uses for mobile data terminals and services emerge. One growing application space is further enablement of existing field service with graphics and repair blueprints. Additionally, trials of such applications as automated meter reading and wireless bill payment have surfaced in the utility industry. We also expect that current wireless data users (for example, utility users) will provide one of the best opportunities for operators and application vendors as the benefits of wireless are already realized, and the devices, networks, and limitations are understood. Gartner Dataquest expects the utility market, which currently represents $115.5 million in revenue for the service providers, to grow to $80.4 million in 2005 (see Table 3-6).

Table 3-6
Utility Revenue in the United States, 2000-2005

	2000	2001	2002	2003	2004	2005
Revenue ($)	71,400,000	94,500,000	115,500,000	111,600,000	97,500,000	80,400,000

Source: Gartner Dataquest (April 2002)

Manufacturing and Construction

For the most part, wireless applications development for manufacturing and construction applications for WANs has been slow to take off. Most of the wireless applications for manufacturing have been of the WLAN variety because of the enclosed space in factories, better in-building coverage and faster speeds. Most likely, the largest benefits that manufacturing companies will have with wireless WANs are in giving inventory and other process information to salespeople or executives outside of the factory.

The one leader in construction applications has been Nextel, which uses its packet data service as a useful extension to its push-to-talk product line — popular with work groups. Nextel offers a number of application that can be beneficial to construction businesses, including access to the TaskPoint Web site, time sheet tracking, equipment tracking, scheduling and management tools, and bid and construction and calculation tools. Nextel has a community of approximately 3,000 developers — coding mostly in C++ — that develop data applications for specific vertical markets, with construction being a large market.

Construction is highly wireless and has the need for people to maintain contact. There are a total of 14 million manufacturing and construction workers in the United States, of which approximately 40 percent (5.5 million to 6 million) are working in construction.

Gartner Dataquest expects the number of subscribers using manufacturing and construction applications to grow from 5,000 in 2000 to 170,000 in 2005, and revenue is expected to grow from $298,500 in 2000 to $27.25 million in 2005. The low total number of construction and manufacturing people using wireless devices for construction-and-manufacturing-specific applications will be because of other types and ways of accessing information, such as PC, paper and so on.

Professional Services

The professional services group includes legal, consulting, market research, accountants, auditors and IT. Legal, IT and consultancies have been leaders in this area, mainly for e-mail and messaging functionality. For legal, obtaining information in a timely manner, the need to be contact with important information and large amounts of time spent out of the office and the silence required in courtrooms make these services important. IT requires alerts of key personnel if there are computer system problems as well as an escalation of the alert if problems are not resolved. IT has been a key leader in this vertical. Consultancies have used wireless services for work schedule planning and expense recording and transmitting. Gartner Dataquest expects growth in the other professional services verticals for looking up information that pertains to that particular field of knowledge, whether it be legal, consulting or market research.

Gartner Dataquest expects the number of subscribers using professional services applications to grow from 10,000 in 2000 to 500,000 in 2005, with a CAGR of 118.67 percent between 2000 and 2005. Revenue is expected to grow from $1.5 million in 2000 to $129.2 million in 2005, with a CAGR of 140.90 percent between 2000 and 2005.

Retail (Point of Sale)

Gartner Dataquest expects the number of connections used for retail purposes to grow from 30,000 in 2000 to 350,000 in 2005, for a CAGR of 63.45 percent between 2000 and 2005. In addition, revenue from WAN retail applications will grow from $2.3 million in 2000 to $60.73 million in 2005 for a CAGR of 92.15 percent between 2001 and 2005. Retail applications include fixed and mobile point of sales devices using WANs. Supporting the potential for this market is that there are more than 2 million service establishments in the United States that employ over 25 million employees. Additionally, there are between 1.5 billion and 2 billion retail establishments in the United States that employ over 22 million employees.

Today, the majority of these wide-area connections are used for point of sales outside the home office, but increasingly they are used for quick installation of credit-card checking equipment.

Retail has a number of promising areas. In point-of-sale applications, which require faster return times for processing credit cards, wireless can be an alternative. An example is fast food restaurants: As the price of food goes up, the customer may want to pay via credit card. At present, credit card processing is too slow for these types of restaurants. Transmission on wide-area wireless networks can reduce the transmission time from 30 seconds to less than five seconds. Another industry dynamic in this market is that the companies providing back-office capability for transactions can now get a piece of the revenue stream and offer it at a lower price vs. and landline connection.

In some cases, the typical fixed installation, which does not require faster turnaround times on credit cards, may use wireless service because they have a lower monthly fee.

Other areas where retail or point of sale can be affected are credit card processing on taxi and limousine services, mobile kiosks, or delivery services.

The two main benefits of a WAN in this case is the ability to do electronic payments anywhere, and be able to do them fast (less-than-five-second turnaround time). Often, these applications are used for short, busy periods of time such as at a stadium or a fair.

Other factors that may impact this market are device add-on, which allows for credit card swiping attached to a standard device such as a Pocket PC or a Handspring device.

Much of the on-floor retailing such as checking inventory and giving advice to salespeople on the storeroom floor is being used by WLAN, and this will continue because of the one-time fixed-cost factor for WLAN and the speed advantage.

Chapter 4
Horizontal Business Applications

Gartner Dataquest has broken down the horizontal business applications into field service, transportation, sales automation / inventory, corporate e-mail / calendar / PIM, enterprise resource management, corporate legacy / file transfer, messaging, document sharing / collaboration, image transmission (digital photography), video transmissions, and location-based services. Categories such as field service and transportation are considered to be horizontal applications because they cross a number of industries.

The subscribers for these various vertical applications are shown in Table 4-1 and Figure 4-1. The leading subscriber groups in 2000 were messaging, e-mail / calendar / PIM, field service and transportation. In 2005, messaging is expected to be the leader with 27 million subscribers, followed by e-mail with 23 million subscribers and sales automation with 2.2 million subscribers. The fastest-growing subscriber groups between 2000 and 2005 are expected to be enterprise resource management, e-mail and messaging.

The revenue for the various vertical applications is shown in Table 4-2 and Figure 4-2. The leading revenue groups by application in 2000 were e-mail, field service and messaging. In 2005, e-mail / calendar / PIM is expected to have the largest revenue contribution at $3.2 billion, followed by messaging at $2.3 billion, field service at $499 million and sales force automation at $408 million. The fastest-growing horizontal business markets in terms of revenue between 2000 and 2005 are expected to be enterprise resource management, sales automation / inventory and messaging.

Following is a breakdown and description of the various vertical markets. These breakdowns will outline the success factors for the various vertical wireless data markets.

Field Service

Field service applications have been a bastion of wireless success and value, with wireless data initiatives often showing positive ROI within nine months. Companies ranging from Sears to MCI have made successful investments in wireless field service applications. Gartner Dataquest expects this market to continue to grow in users and functionality. Current applications focus on job scheduling and dispatch, and provide value by adding to the number of stops via more efficient dispatch, rapid rescheduling for rush or emergency jobs and notification when jobs are complete. With increased bandwidth and the introduction of location-enhanced services, the field service market will continue to experience high growth in revenue and users. New applications that report and route techs based on current location, coupled with the ability to send image and diagnostic / schematic files directly to the field will open up a new wave of adoption within the field service user base.

With an estimated 4.5 million field service employees, including telecommunications repair and HVAC techs, the market, while well marketed and sold into, continues to represent an enormous opportunity for applications and service vendors. Gartner Dataquest believes that there are 650,000 field service users in the United States, with that number growing to 1.5 million by 2005 (see Figure 4-3).

Table 4-1
Horizontal Business Market Wireless Data Subscribers in the United States, 2000-2005

	2000	2001	2002	2003	2004	2005	CAGR (%) 2000-2005
Field Service (Maintenance and Repairs)	400,000	500,000	650,000	850,000	1,100,000	1,500,000	30.26
Transportation (Trucking, Public Transportation and Couriers)	300,000	380,000	500,000	650,000	800,000	1,000,000	27.23
Sales Automation / Inventory (Insurance, Real Estate and Distribution)	50,000	75,000	100,000	500,000	1,200,000	2,200,000	113.15
Corporate E-Mail / Calendar	700,000	1,300,000	2,500,000	7,000,000	13,000,000	23,000,000	101.06
Enterprise Resource Management	2,000	5,000	40,000	100,000	250,000	500,000	201.71
Corporate Legacy / File Transfer (Accesses Corporate Intranets and Remote Control of Documents)	100,000	150,000	200,000	400,000	700,000	1,050,000	60.04
Messaging	1,000,000	2,500,000	4,000,000	8,000,000	15,000,000	27,000,000	93.32
Document Sharing / Collaboration (Lotus Notes)	0	2,000	4,000	10,000	25,000	60,000	NA
Image Transmission (Digital Photography)	0	500	2,000	20,000	100,000	300,000	NA
Video Transmissions	0	0	0	250	500	1,000	NA
Location-Based Services	0	1,000	50,000	200,000	800,000	2,000,000	NA

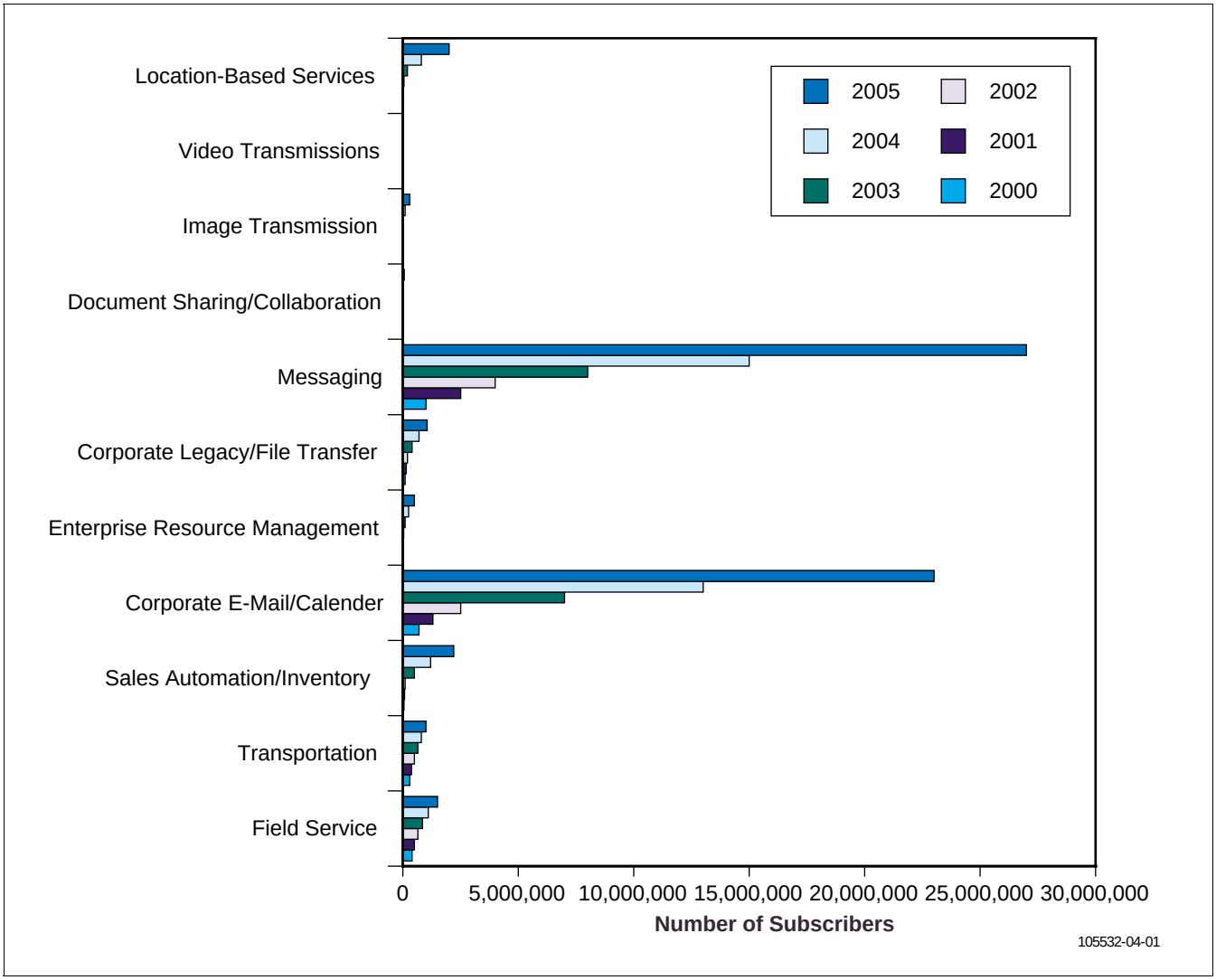
Source: Gartner Dataquest (April 2002)

Table 4-2
Horizontal Business Market Wireless Data Revenue in the United States, 2000-2005 (U.S. Dollars)

	2000	2001	2002	2003	2004	2005	CAGR (%) 2000-2005
Field Service (Maintenance and Repairs)	175,500,000	226,800,000	262,200,000	324,000,000	397,800,000	499,200,000	23.25
Transportation (Trucking, Public Transportation and Couriers)	81,000,000	114,240,000	137,280,000	165,600,000	191,400,000	216,000,000	21.67
Sales Automation / Inventory (Insurance, Real Estate and Distribution)	7,800,000	18,000,000	24,150,000	79,200,000	214,200,000	408,000,000	120.65
Corporate E-Mail / Calendar / PIM	243,000,000	420,000,000	684,000,000	1,425,000,000	2,400,000,000	3,240,000,000	67.88
Enterprise Resource Management	240,000	756,000	4,590,000	13,440,000	31,500,000	63,000,000	204.67
Corporate Legacy / File Transfer (Accesses Corporate Intranets and Remote Control of Documents)	21,600,000	43,500,000	58,800,000	93,600,000	158,400,000	231,000,000	60.63
Messaging	117,000,000	252,000,000	429,000,000	720,000,000	1,380,000,000	2,268,000,000	80.92
Document Sharing / Collaboration (Lotus Notes)	0	240,000	648,000	1,344,000	2,940,000	6,120,000	NA
Image Transmission (Digital Photography)	0	30,000	150,000	1,188,000	5,760,000	16,800,000	NA
Video Transmissions	0	0	0	150,000	427,500	810,000	NA
Location-Based Services	0	90,000	4,284,000	19,500,000	69,000,000	168,000,000	NA
Total	**646,140,000**	**1,075,656,000**	**1,605,102,000**	**2,843,022,000**	**4,851,427,500**	**7,116,930,000**	**61.58**

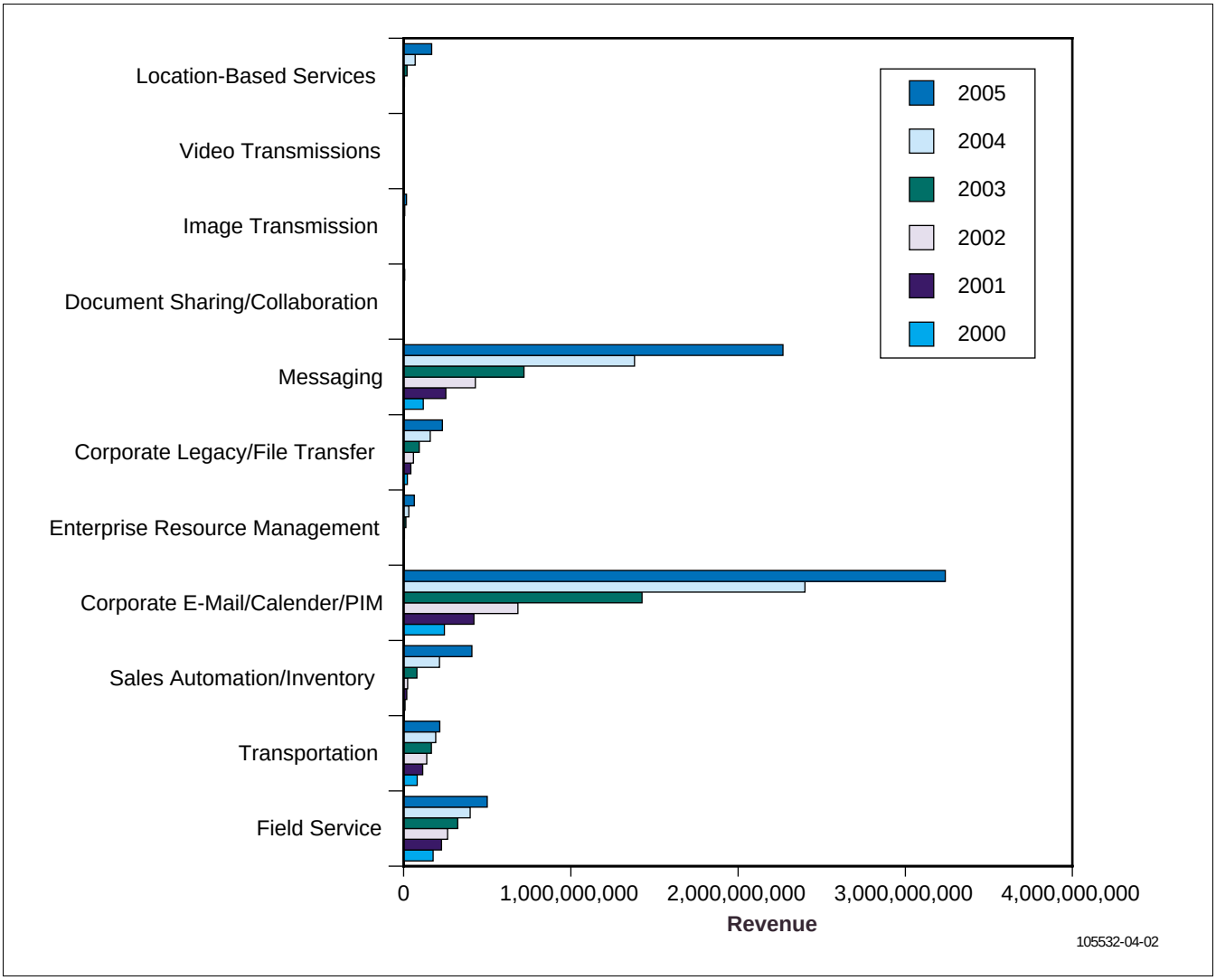
Source: Gartner Dataquest (April 2002)

Figure 4-1
Horizontal Business Market Wireless Data Subscribers in the United States, 2000-2005



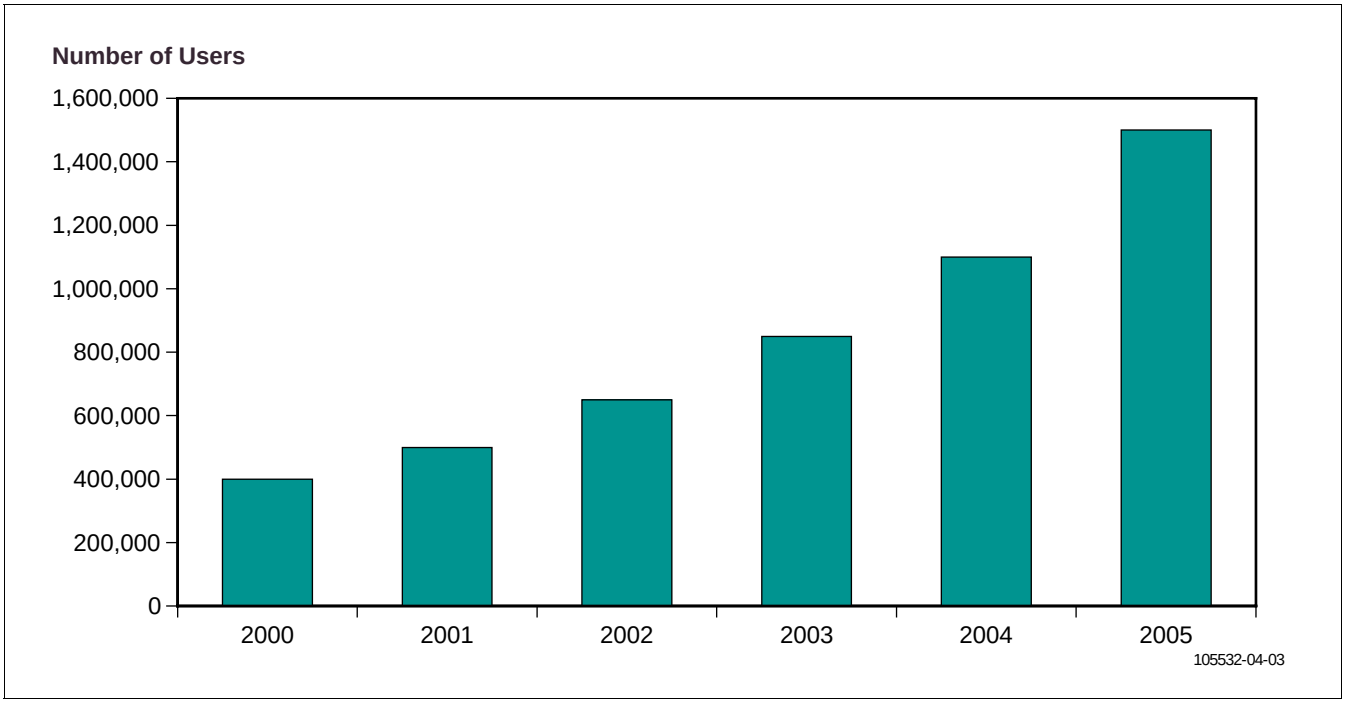
Source: Gartner Dataquest (April 2002)

Figure 4-2
Horizontal Business Market Wireless Data Revenue in the United States, 2000-2005



Source: Gartner Dataquest (April 2002)

Figure 4-3
Field Service Users in the United States, 2000-2005



Source: Gartner Dataquest (April 2002)

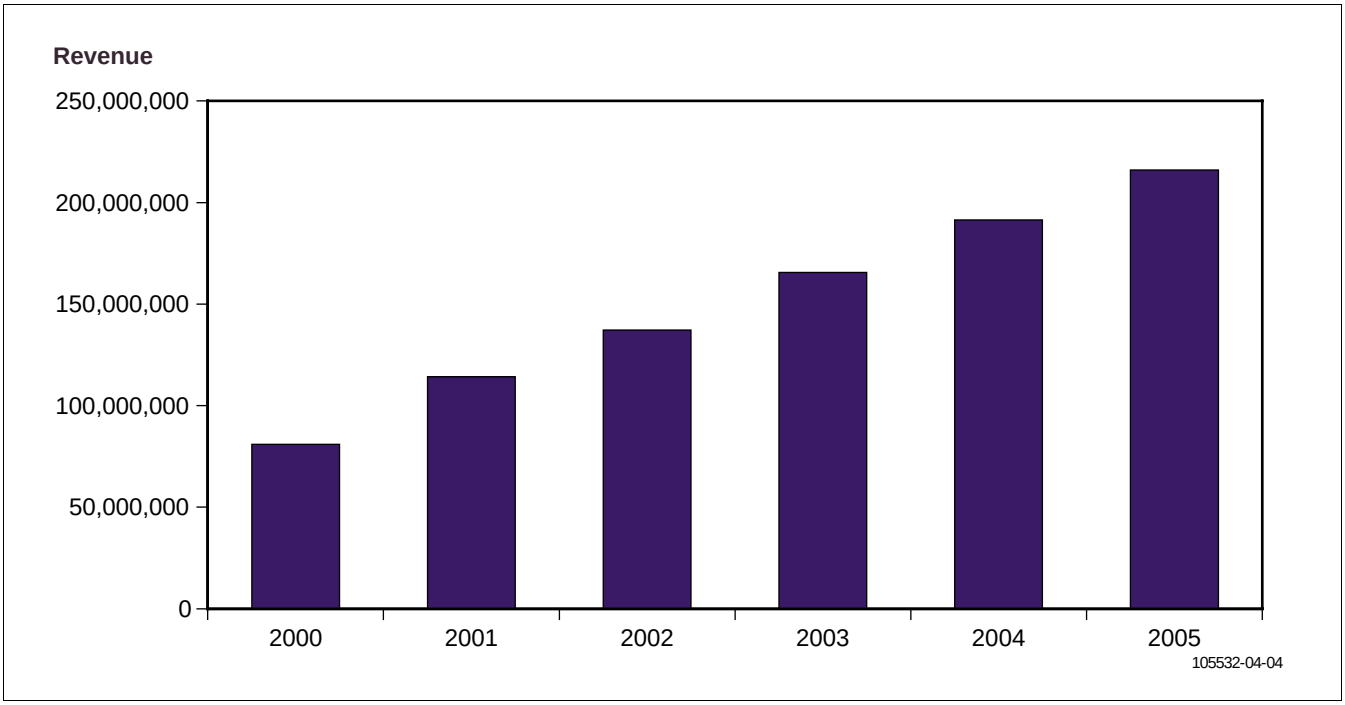
Transportation

Transportation has also long been a wireless success story because of the mobility of the user base and its need for real-time reporting of location and status. Transportation has and will continue to represent a need for wireless data connectivity. Examples of users in this space are taxi and limousine companies as well as buses and trains. Many have operated private networks with specialized radios, frequencies and terminals. However, this has become an increasingly expensive proposition, partially because of falling costs and increasing coverage for public data services. Some have made the switch to packet-based public networks (CDPD in particular), but Gartner Dataquest believes that more will look to public networks as bandwidth increases and location services become available.

The majority of the applications available and used in this space center on dispatch, billing and reservation management. These will continue to take the lion's share of the applications, but location enhancements will add a new element of efficiency and functionality to this space. Gartner Dataquest also expects a higher degree of end-user involvement in the dispatch and status reporting process (for example, when the end user arrives at the airport he can use a mobile data device or phone to check the status and location of his ordered limousine).

Gartner Dataquest estimates the service revenue in 2000 was $81 million; we expect revenue to grow to $216 million by year-end 2005 (see Figure 4-4).

Figure 4-4
Wireless Transportation Service Revenue in the United States, 2000-2005



Source: Gartner Dataquest (April 2002)

Sales Force Automation

Gartner Dataquest estimates that there are 10 million salespeople in the United States. Some of the leading industries for sales are wholesaling, manufacturing, financial services, real estate and insurance. Other industries that may benefit from the use of wireless services for their sales forces include pharmaceuticals and distribution of goods.

Gartner Dataquest expects the number of subscribers using sales force automation applications to grow from 100,000 in 2000 to 2.2 million in 2005, with a CAGR of 85.56 percent between 2000 and 2005. Revenue is expected to grow from $8.4 million in 2000 to $485.8 million in 2005, with a CAGR of 124.9 percent between 2000 and 2005. Sales force automation applications include software that allows the users to do any of the following: call up customer records, input and send wirelessly customer orders, check inventory levels for customers and do on-the-spot ordering or job bidding.

Much of the usage of sales and inventory tools has been to make the input on the road via a PDA or laptop and synchronize the data upon returning to the office. Some of the factors holding back wireless adoption include wireless coverage, wireless data speeds, access to real-time information and lack of robust sales automation capabilities. Gartner Dataquest believes that high-speed packet data will provide a user interface that is more comparable to what the salesperson has experienced with the PC, and will provide sufficient coverage to not frustrate the user.

The need for salespeople to have wireless devices depends on a number of factors: the responsiveness needed to drive business workflows; the need for updated information to learn about the client, make a sale to a client, or inform the client; respond to a competitor's bid; sales communications to the mobile sales force; and the impression the wireless device and service have on the client.

Some clear examples of where wireless sales force automation can improve the company's bottom line are manufacturing companies where responsiveness to shipping or delivery or responsiveness to customers in terms of inventory availability is important. In addition, financial services can use wireless as a selling tool by giving a quote on the spot, or respond to a competitor's quote while in the customer's office.

Some of the companies with wireless sales force automation software in the market today include Oracle, Siebel, Salesnet, MobileQ and Upshot.Com.

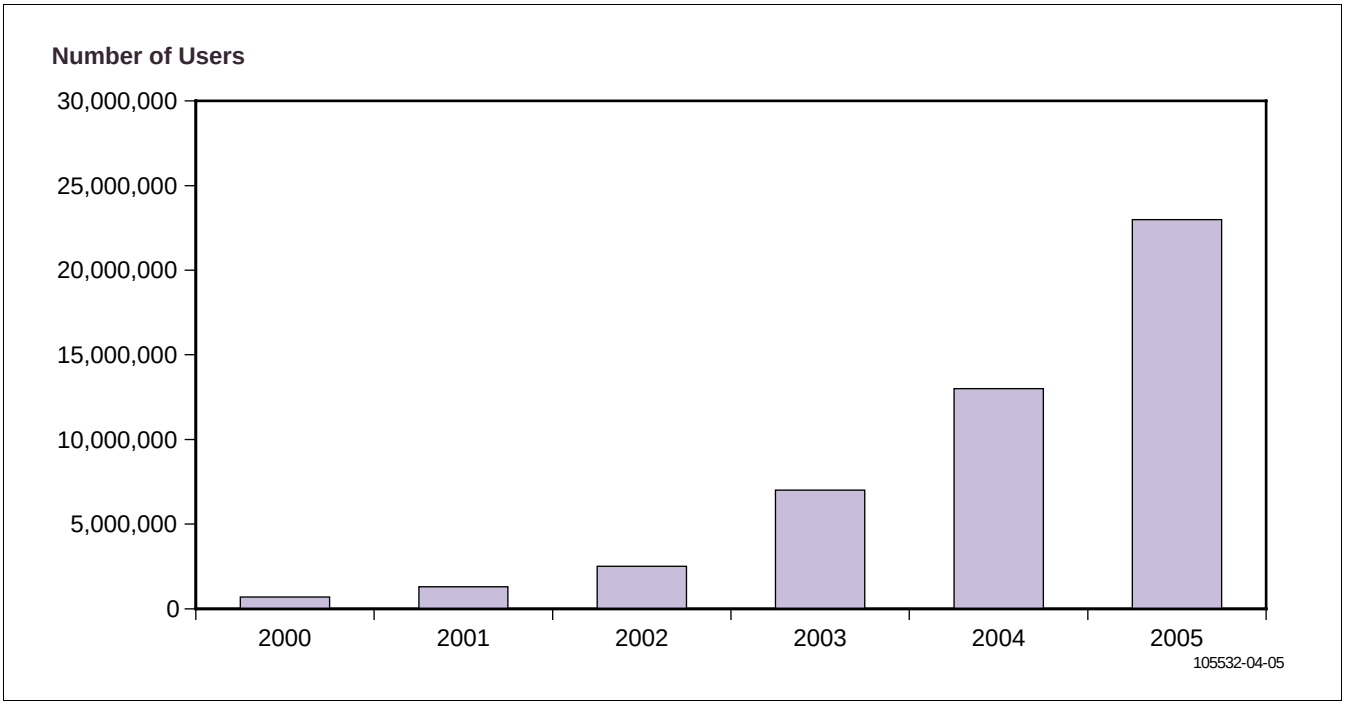
E-Mail

E-mail is one area that only recently has seen substantial growth, from e-mail-specific terminals / devices, such as the products from RIM and Motorola, to a more grassroots effort of field service and transportation users sending e-mail while on the road. Given the massive e-mail user base and the long-standing IT support for the application (as well as its understood benefits), Gartner Dataquest believes that this application is one poised for potentially enormous growth.

However, current network coverage and throughput makes for anything other than simple text-based messages a difficult proposition. This, in combination with the available device display and input capabilities, has slowed adoption in this space. With higher-speed networks and increasingly data-capable devices entering the market, Gartner Dataquest expects that IT departments will increasingly understand the value of extending e-mail beyond the desktop. This will, however, start with end users demanding this functionality rather then IT pushing it out to users. Carriers such as Sprint PCS and AT&T Wireless are looking to capitalize on the base of enterprise users with e-mail and PIM services, and increase their usage of wireless data with this application. Issues around security, input / display, the handling of attachments and integration issues have all surfaced in the enterprise user base. These issues will need real solutions before the predicted growth occurs.

Some of the leading vendors in this space are RIM, Wireless Knowledge, Microsoft and Lotus. All have 2G product offerings and have seen some traction in the enterprise space, although because of the issues identified, none have seen widespread adoption. Gartner Dataquest expects that many of those issues will be solved and this market will grow from its user base of 2.5 million users to 23 million vertical users in 2005, representing the lion's share of the mobile workforce (see Figure 4-5).

Figure 4-5
Wireless E-Mail and PIM Users in the United States, 2000-2005



Source: Gartner Dataquest (April 2002)

ERM

One area for potential growth in horizontal business applications is ERM. ERM uses technology to digitally empower the workforce through efficient processes and transaction management across many enterprise functions and departments.

There are several instances where this can have an impact on the mobile worker, including streamlining and ease of entry for expenses, allowing for purchasing approval while the employee is on the road, and allowing access to benefits information while on the road.

Most of the introduction of these types of services has been done by wireless ASPs for consulting companies and enterprises for expense recording and entry. Still, Gartner Dataquest expects this to grow as enterprises desire to gain greater efficiencies from and better communication with their mobile workers.

Gartner Dataquest expects the number of wireless subscribers using ERM applications to grow from 2,000 in 2000 to 500,000 in 2005, with a CAGR of 201.71 percent between 2000 and 2005. Revenue is expected to grow from $132,491 in 2000 to $70.8 million in 2005, with a CAGR of 251.26 percent between 2000 and 2005.

Video

Mobile video is one application space where we do not expect to see high number of users or revenue over the next three to four years. The value proposition in the corporate space is still ill-defined and usability on mobile devices is questionable. Even with faster data networks and color displays coming into the market over the next two to three years, the costs and limitation of mobile video will prevent its widespread adoption and keep revenue and user numbers low. Few carriers have shown interest in marketing these services to their existing enterprise user base.

Some of the vendors focused on this space are Packet Video, Solid Streaming, Celvibe, and ActiveSky. Gartner Dataquest expects that in the long term some consumer-based applications utilizing video may gain some users, but the cooperate space will remain an elusive target for wireless video vendors.

Location-Based Services

Location-based services used by business employees can be used for a number of functions that improve the efficiency of the business. These functions include using location-based services to find the quickest and most accurate route to a particular location using maps, driving instructions and traffic reports. This can be used by a number of employees such as salespeople, executives, field service, transportation employees and so on. The goal of these applications is to increase the number of work-related stops and save on transportation expenses.

Another location-based service is employee tracking. Employee tracking can be used for a number of different functions: to locate emergency personnel and route them to the emergency situation; to find the approximate location of a work group member, to dispatch a fleet of vehicles including taxis, limousines, delivery vehicles; and to track workers to ensure they are on the proper route and are on the job (fleet management).

Some location-based services are of the telemetry variety where the location tracking systems is located on the vehicle or shipping container. These are not tracked by this report.

Some of the companies in the location-based services market include SignalSoft and BFound, Cell-Loc, @Road, Webraska, Web Tech, Aether Systems, and Darby Corporate Solutions with Nextel.

Gartner Dataquest expects the number of wireless subscribers using business location-based applications to grow from 1,000 in 2001 to 2 million in 2005, and revenue is expected to grow from $62,394 in 2001 to $188.9 million in 2005. The market for business-related location-based services is slow, but this is expected to change over the next five years as carriers implement more accurate location-based technology on handsets, as data services have better coverage, as business users have more data-capable devices, as carriers offer services to businesses to create value and reduce churn, and as these services are accepted into the mainstream as a whole. Gartner Dataquest does not expect personal privacy concerns to be an issue for business-related location-based services.

Chapter 5
Personal Applications

Gartner Dataquest has broken down the personal applications into information services (such as weather, sports, maps and horoscopes), messaging, e-mail, financial services, location services, m-commerce (nonfinancial services), image transmission (digital photography), video transmission, audio transmission, home automation, entertainment (such as jokes, video clips, cartoon characters and ring tones), games, customer service, e-coupons, and advertising (contextual).

The subscribers for these various vertical applications are shown in Table 5-1 and Figure 5-1. The leading subscriber groups in 2000 were information services, messaging, and entertainment. In 2005, information services is expected to be the leader with 110 million subscribers, followed by messaging with 100 million subscribers, and entertainment and advertising with 48 million subscribers. The fastest-growing subscriber groups between 2000 and 2005 are expected to be image transmission (digital photography), customer service and m-commerce.

The revenue for the various vertical applications is shown in Table 5-2 and Figure 5-2. The leading revenue groups by application in 2000 were messaging, information services and e-mail / calendar / PIM. In 2005, messaging is expected to have the largest revenue contribution at $6.4 billion, followed by information services at $1.1 billion, entertainment at $876 million, location services at $720 million and games at $636 million. The fastest-growing horizontal business markets in terms of revenue between 2000 and 2005 are expected to be image transmission, m-commerce and advertising.

Information

Information gained via the wireless Internet is one of the most popular applications and the information sought is quite varied. Internet users search for information on sports, weather, news, traffic, airline, entertainment, restaurants and bars, stock quotes and investments, hotels, activities, consumer reviews, price checks, and cooking.

Gartner Dataquest expects the number of wireless subscribers using information applications to grow from 3.5 million in 2000 to 110,000 million in 2005, with a CAGR of 92.56 percent between 2000 and 2005. Revenue is expected to grow from $14.9 million in 2000 to $1.2 billion in 2005, with a CAGR of 141.11 percent between 2000 and 2005.

The goal of carriers has been to attract people to the wireless Web by providing them with information that they are interested in. Information can be offered for a nationwide audience or a local audience. The top information requests are news, traffic, weather and sports. However, various types of other information, such as airline information, stock quotes and hotel information, are valuable to niches in the market.

Revenue can be generated from information by advertising, and by e-commerce "click-throughs. To capture some additional revenue, carriers will continue to offer a wide variety of information.

Table 5-1
Personal Market Wireless Data Subscribers in the United States, 2000-2005

	2000	2001	2002	2003	2004	2005	CAGR (%) 2000-2005
Information Services (Weather, Sports, Maps and Horoscopes)	3,500,000	8,000,000	20,000,000	38,000,000	70,000,000	110,000,000	99.28
Messaging	1,200,000	2,500,000	6,000,000	20,000,000	60,000,000	100,000,000	142.19
E-Mail	200,000	300,000	600,000	2,000,000	8,000,000	20,000,000	151.19
Financial Services	150,000	275,000	450,000	2,000,000	6,000,000	15,000,000	151.19
Location Services	2,000	10,000	100,000	5,000,000	15,000,000	40,000,000	624.78
M-Commerce (Nonfinancial Services)	20,000	186,470	1,097,276	2,882,673	8,679,504	24,888,318	315.90
Image Transmission (Digital Photography)	1,000	2,000	4,000	100,000	500,000	2,000,000	357.31
Video Transmissions	0	0	500	1,500	5,000	30,000	NA
Audio	0	0	0	1,000	10,000	50,000	NA
Home Automation	0	0	1,000	3,000	10,000	30,000	NA
Entertainment (Jokes, Video Clips, Cartoon Characters and RingTone)	300,000	600,000	2,000,000	10,000,000	25,000,000	48,000,000	175.95
Games (By Type)	150,000	700,000	2,000,000	8,000,000	17,000,000	36,000,000	199.26
Customer Service	20,000	50,000	200,000	3,000,000	15,000,000	25,000,000	316.28
E-Couponing (Profile)	0	60,000	120,000	1,000,000	2,000,000	5,000,000	NA
Advertisements (Contextual)	100,000	600,000	1,200,000	10,000,000	20,000,000	48,000,000	243.75

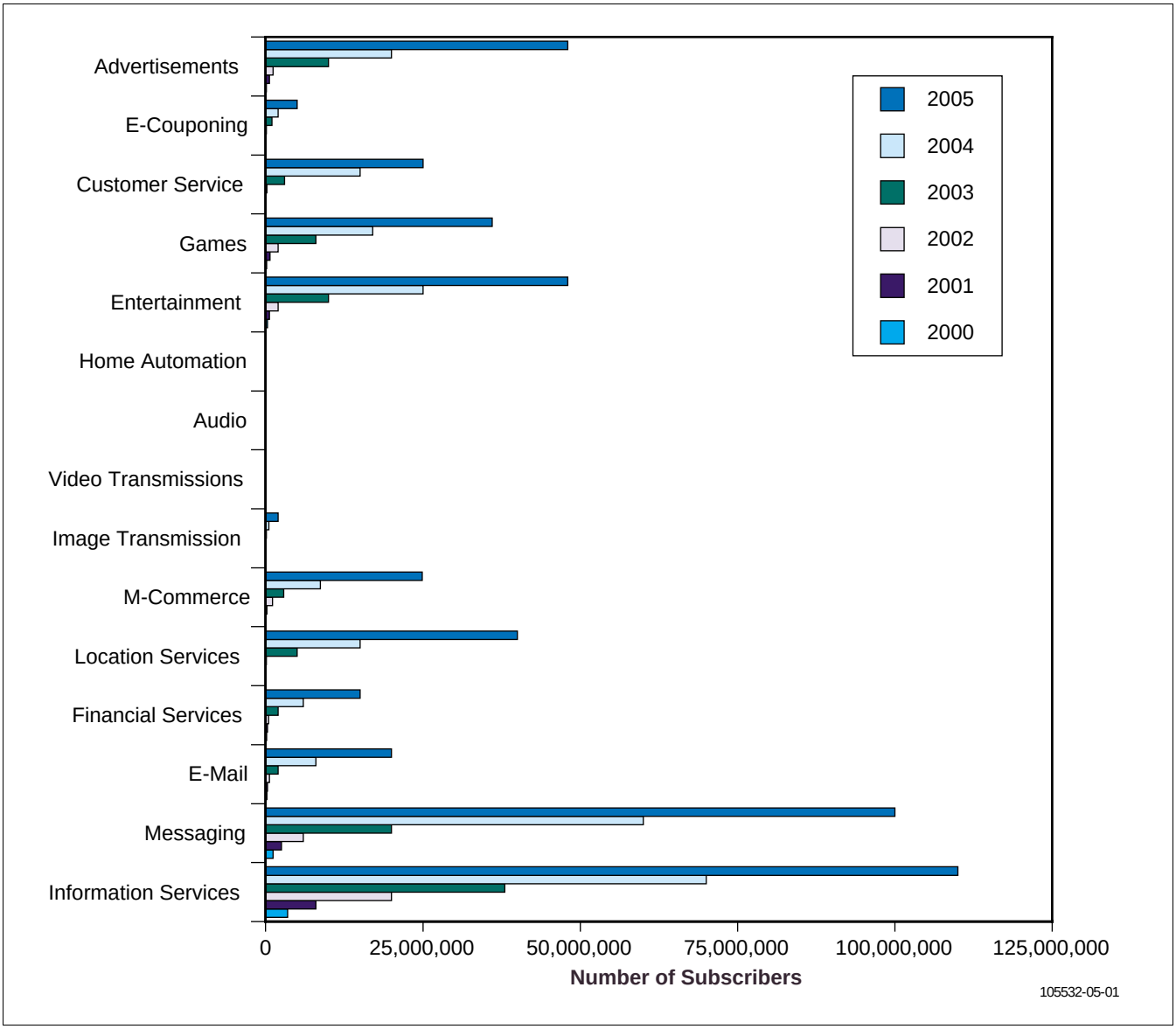
Source: Gartner Dataquest (April 2002)

Table 5-2
Personal Market Wireless Data Revenue in the United States, 2000-2005 (U.S. Dollars)

	2000	2001	2002	2003	2004	2005	CAGR (%) 2000-2005
Information Services (Weather, Sports, Maps and Horoscopes)	27,000,000	69,000,000	168,000,000	348,000,000	648,000,000	1,080,000,000	109.13
Messaging	81,000,000	177,600,000	408,000,000	1,092,000,000	3,360,000,000	6,240,000,000	138.42
E-Mail / Calendar / PIM	7,500,000	13,500,000	22,950,000	62,400,000	210,000,000	504,000,000	131.99
Financial Services	2,400,000	5,100,000	8,700,000	28,665,000	91,200,000	226,800,000	148.36
Location Services	42,000	216,000	1,650,000	61,200,000	240,000,000	660,000,000	590.65
M-Commerce (Nonfinancial Services)	60,000	619,409	4,236,361	14,327,817	52,029,795	201,406,930	407.21
Image Transmission (Digital Photography)	12,000	40,500	90,000	1,872,000	12,600,000	60,000,000	449.28
Video Transmissions	0	0	15,000	60,000	195,000	1,050,000	NA
Audio	0	0	0	18,000	198,000	1,080,000	NA
Home Automation	0	0	18,000	48,000	117,000	240,000	NA
Entertainment (Jokes, Video Clips, Cartoon Characters and RingTone)	3,600,000	10,800,000	31,200,000	144,000,000	420,000,000	876,000,000	200.08
Games (By Type)	1,800,000	11,220,000	38,880,000	150,000,000	337,500,000	636,000,000	223.32
Customer Service	0	0	0	0	0	0	NA
E-Couponing (Profile)	0	36,000	216,000	1,680,000	5,400,000	16,800,000	NA
Advertisements (Contextual)	18,000	264,600	777,600	5,376,000	16,200,000	32,640,000	348.43
Total	**123,432,000**	**288,396,509**	**684,732,961**	**1,909,646,817**	**5,393,439,795**	**10,536,016,930**	**143.36**

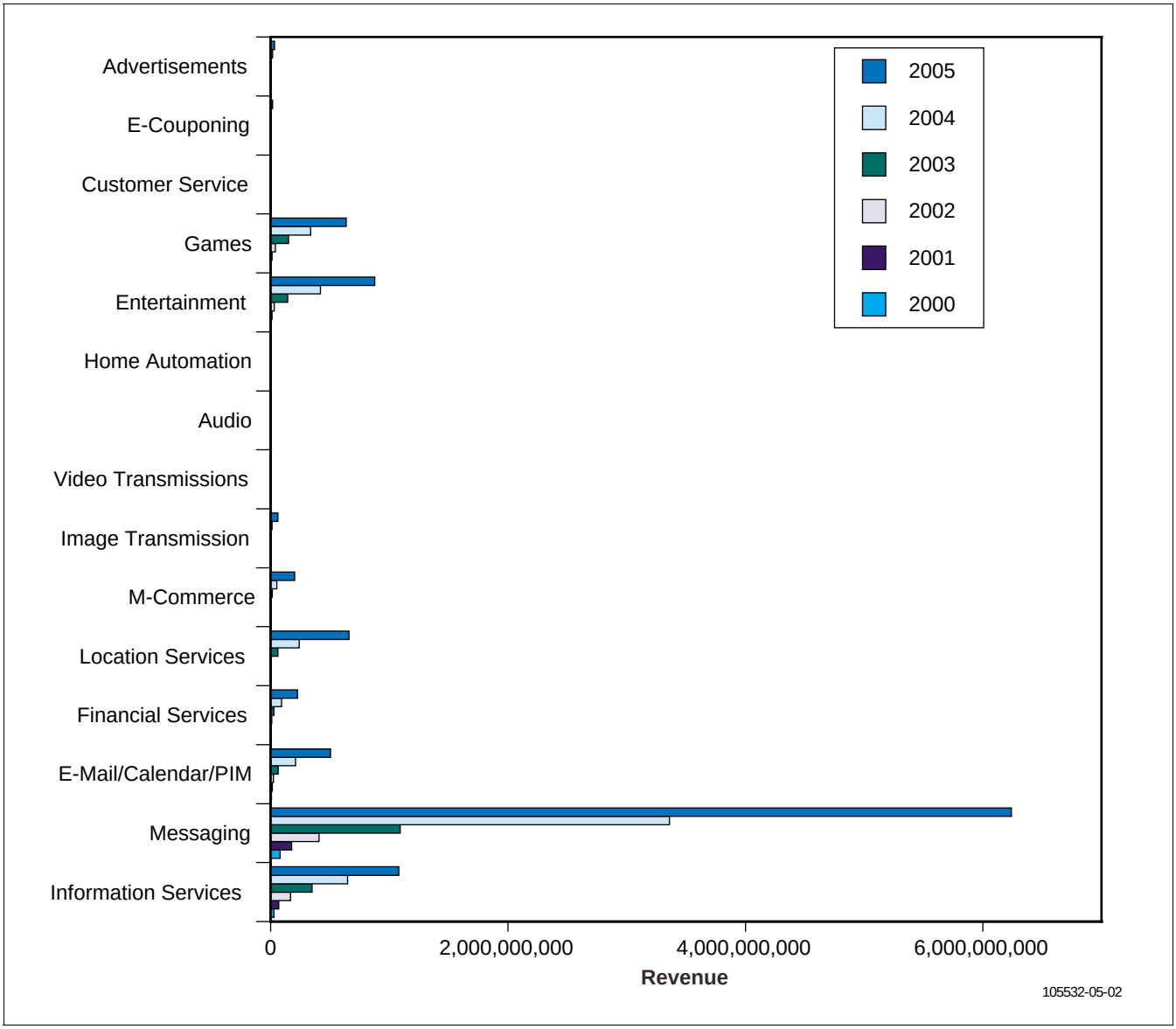
Source: Gartner Dataquest (April 2002)

Figure 5-1
Personal Market Wireless Data Subscribers in the United States, 2000-2005



Source: Gartner Dataquest (April 2002)

Figure 5-2
Personal Market Wireless Data Revenue in the United States, 2000-2005



Source: Gartner Dataquest (April 2002)

In addition to providing information via a data portal, Leap Wireless has offered information on sports, weather and traffic via voice for approximately $3 a month. A number of voice portals are also in the market such as Hey Anita, Tellme Quack, and others that offer information and use advertising as the revenue model. It is expected that carriers will offer a voice and data option to information.

Messaging

Messaging in the United States has yet to experience the rapid user and revenue growth that Europe has seen in its SMS market; issues around carrier interoperability and availability of end-user devices have stymied its adoption. Because of recent events (such as AT&T Wireless's announcements around inter-carrier interoperability and Verizon's messaging marketing push) coupled with the rollout of packet data services, Gartner Dataquest believes that this market will grow substantially over the next three to four years. Driven by packet data services, carrier interoperability, multimedia messaging in concert with color displays and improved input capabilities, the user base and revenue are poised for rapid growth.

Current ARPUs remain high, as the majority of users are on packet data-only networks (for example, ReFlex two-way paging and Mobitex DataTAC) from vendors such as Cingular Interactive and Motent. But with more options quickly coming to market from the traditional wireless voice vendors (such as AWS, Verizon and VoiceStream), Gartner Dataquest believes that this will cause ARPUs to fall and the user base to grow.

Interoperability / integration with existing IM applications will also drive rapid growth in this space. As the heavyweights of the IM space (such as AOL, Yahoo! and MSN) look to better integrate their service / applications with the mobile world, the addressable market for wireless messaging grows exponentially (see Table 5-3).

Table 5-3
Wireless Messaging Revenue in the United States, 2000-2005

	2000	2001	2002	2003	2004	2005
Revenue ($)	81,000,000	177,600,000	408,000,000	1,092,000,000	3,360,000,000	6,240,000,000

Source: Gartner Dataquest (April 2002)

E-Mail

As one of the most widely used wireline applications, e-mail is perhaps the "killer application" of networked computing. Gartner Dataquest believes that that success and popularity is easily transferable to the wireless world. E-mail will likely be a hugely popular wireless application, though not in a traditional sense; its integration with messaging for alerts and short messages will be the emphasis of this application area. Again, issues around input and display coupled with the security issues (less of a problem in the personal space than in the enterprise space) and the handling of attachments have and will continue to slow the adoption of this application. However, next-generation networks and terminals promise to solve many of these issues. E-mail at its simplest form is communication, analogous to the original purpose of wireless terminals.

Universal mailbox-type services and applications that combine wireless and wireline e-mail and voice mailboxes may provide an additional revenue / user boost for this application area. Because of its constant proximity to the user, the wireless terminal has a unique opportunity to provide value as an inbox consolidator. Companies such as Openwave, Comverse, Nokia and Ericsson are actively pursuing this space.

Financial Services

Wireless financial services, which include wireless banking and wireless stock trading, have received a lot of attention in the United States over the past two years. A number of banks and investment companies have entered this market, including Fidelity, Charles Schwab, Harris Bank, Wells Fargo, Bank of America, First Union, NetBank, Wachovia, E*Trade, TD Waterhouse, DLJ Direct, Ameritrade and Claritybank.com.

The solutions offered to customers include checking bank balances, transaction histories, the ability to transfer money between accounts, monitoring stock portfolios, setting up watch lists, receiving new alerts, and buying and selling stock.

Future expected services include paying bills wirelessly and banking notifications. Banks are looking for security solutions to provide these services that are compatible with online security systems.

What banks are looking for is a way to reduce the cost of doing transactions, as well as offering a service that customers find more convenient. In some cases, banks are also looking for wireless to be an extension of their online banking services. Banks want to maintain the relationship with the customer where they are the main interface.

Wireless carriers are looking for usage charges and a hook to get and keep customers. Some of the service providers that are offering wireless banking services include Palm.Net, Sprint PCS, Verizon, Nextel, Cingular Interactive and Motient. Bell Mobility in Canada has found wireless banking to be one of its most popular applications.

Banks and investment companies offer these services on a number of different devices, including wireless handsets, PDAs, two-way pagers and laptops. Some of the solutions providers for banking applications include 724 Solutions, Aether, W-Technologies and Air2Web.

Some of the aspects that may help boost financial service usage are faster data speeds and color screens, which the user perceives to be like a miniature computer or ATM. Ease of use and personalization will also be important considerations in moving this market forward. Consumers in general are confident with the security in place, as the bank has endorsed this service.

Gartner Dataquest expects the number of wireless subscribers using consumer financial service applications to grow from 150,000 in 2000 to 15 million in 2005, with a CAGR of 171.76 percent between 2000 and 2005. Revenue is expected to grow from $1.3 million in 2000 to $255 million in 2005, with a CAGR of 186.35 percent between 2000 and 2005. The growth in this market will be because of the banks' need to have a constant interface with customers, the increased number of mobile devices with data services, and the increase convenience of mobile banking and investing.

Location-Based Services

Location enhancements to existing and future applications will be one of the largest and most profitable markets for wireless data over the next three to four years. However, location-only services will find little traction among wireless users, without better display and download options. The E911 mandate from the FCC has few consequences for noncompliance and has been moved back enough times where it poses little real reason for the carriers to roll these services out. Rather, Gartner Dataquest believes it will be competitive pressures that accomplish what the FCC has been unable to do, and will force the carriers to enable the networks. Companies in this space, such as Webraska and Mapquest, have been in limbo as the carriers have dragged their feet in rolling out the services and necessary infrastructure to support them. Questions around personal privacy and the security of the location information remain on the table and must be answered before this market can grow.

Recent announcements from Sprint PCS and Qualcomm imply that we may see location-enabled services as soon as the second half of 2002. It remains to be seen, however, when other carriers will launch the location-enabled elements. Gartner Dataquest believes that location services will provide a competitive advantage and enough customer stickiness that other carriers will rapidly move to roll out competing services.

Gartner Dataquest expects that this market will grow to 40 million users by 2005 from a nearly nonexistent user base because of the current unavailability of network support and terminals for location applications (see Table 5-4).

Table 5-4
Location Service Subscribers in the United States, 2000-2005

	2000	2001	2002	2003	2004	2005
Subscribers	2,000	10,000	100,000	5,000,000	15,000,000	40,000,000

Source: Gartner Dataquest (April 2002)

M-Commerce

Gartner Dataquest expects that m-commerce will grow from small usage patterns in 2000 to an important wireless data application in 2005. M-commerce is any sale of goods or services made using a wireless data connection. In 2001, the withdrawal of Amazon.com and SNAZ.com were major disappointments in the m-commerce arena. This does not, however, mean that m-commerce will not be successful in the future.

Gartner Dataquest believes that carriers will use m-commerce services as away to attract and keep customers and drive revenue through airtime and revenue sharing. M-commerce will provide a distribution channel for goods and services, which may be better sold on the wireless Internet or to people who are using the wireless Internet. M-commerce will reach its full potential after taking a number of steps:

- More wireless data devices in users' hands
- Convenience in using user interfaces and services — The wireless Internet must be more convenient than other distribution channels for purchasing items. Packet data services and color screens should help with the user interaction in purchasing goods. Location-based services are expected to increase the convenience of m-commerce.

- Personalization of the wireless Internet — End users must bookmark and organize their wireless portals to make the experience most convenient. Belonging to clubs or groups on the wireless Internet can drive wireless advertising and click-through purchases.
- End-users' awareness that this is a viable and convenient way to make transactions
- End-users' comfort level that their financial and personal information will be secure

Some of the items that Gartner Dataquest believes will sell well on the wireless Internet include:

- Access (such as theaters, movies, concerts, sporting events and museums)
- Travel (such as airlines, public transportation and car rentals)
- Concierge-type services (such as mapping and directional information)
- Home essentials (such as groceries, fast food and take-out)
- Easily recognizable and nondurable goods (such as CDs and books)

Not every item is going to sell well on the wireless Internet, however. Items that can easily be described or picked out, that do not have prohibitive shipping costs, and that allow for transactions to simplify the life of the mobile user are all expected to do well on the wireless Internet.

Gartner Dataquest expects the number of wireless subscribers using m-commerce service applications to grow from 20,000 in 2000 to 24.9 million in 2005, with a CAGR of 239.90 percent between 2000 and 2005. Service provider revenue is expected to grow from $33,123 in 2000 to $227.6 million in 2005, with a CAGR of 485.34 percent between 2000 and 2005.

Gartner Dataquest expects that m-commerce transactions of good and services will reach nearly $10 billion by 2005. For more detailed analysis of the m-commerce market and a breakdown of goods and services sold via m-commerce, please see the Gartner Dataquest Research Note "U.S. M-Commerce Market: Slow to Develop" (M-14-5621).

Companies providing m-commerce solutions include 724 Solutions, Q-Pass, Boston Communications and Barpoint.Com. In addition, the major credit card companies have set up a mobile payment forum. These companies include Last week, American Express, JCB, MasterCard and Visa. The goal of the forum is to develop standards for secure mobile payments via credit card transactions and to address m-commerce issues such as interoperability, passwords, and cardholder authentication and encryption methods.

Carriers that offer m-commerce or access to m-commerce sites include Sprint PCS, Verizon, Alltel, Cingular, AT&T Wireless, VoiceStream, Motient and the two-way ReFlex Messaging companies.

In addition to m-commerce purchases, the wireless Internet as an information source can play a large role in driving revenue by purchases that are researched or arranged via a data-enabled cellular phone or PDA, but actually completed via other means such as going to the store or calling a salesperson. Gartner Dataquest does not classify these transactions as m-commerce but as "mobile-enabled transactions."

Image Transmission

Picture postcards, multimedia messaging and digital camera-equipped handsets all paint a pretty picture of users snapping pictures while on vacation or out on the town and sending them out to everyone they know over a wireless data connection, thereby generating revenue for network operators. The reality, however, is not as rosy. Issues around imaging standards, poor display capabilities and a lack of higher-speed packet data networks contribute to a lack of users for this application. The introduction and adoption of color displays and higher-speed packet data networks will go a long way toward solving many of these issues, but before this application can truly succeed, a critical mass of terminals and carrier rollout of higher-speed packet data services must first occur. Companies as widely varied as Kodak, Xerox and Nokia have all expressed interest in this application area.

Video Transmission

While video transmission and viewing is an often-mentioned 3G wireless application, we believe that it is one not likely to happen anytime soon because of high bandwidth requirements for download, display limitations and lack of compelling content. However, with some of the network enhancements, handset evolution and growing carrier support, the possibilities for this application become a little better. Short, marketing-focused video clips are most likely to happen first, with advertisers paying for the distribution and associated service charges. Some of the pay-for-play types of services that give consumers minutes of service for viewing advertising will also be one use for these services. Lastly, as terminal evolution continues and local storage becomes a reality, and as downloading clips during slower network times and the storage of more personal clips is enabled, Gartner Dataquest expects to see some uplift in the number of users and the associated revenue. Packet video has been one of the leading companies in this space, although all of the major infrastructure vendors are interested in this market.

Audio

Audio downloads and playback has a near-perfect fit with the portability of mobile devices, as well as the possibility for component and memory sharing. We've already seen limited success with the products from Samsung (such as Samsung Uproar), but that was simply storage on the mobile device with the downloading of the files occurring over the wireline network. Gartner Dataquest believes that the download of music and audio clips to a device via the wireless network will not produce significant amounts of traffic or revenue for the wireless carriers in the near term. This is mainly because of the large size of the files and the speed and cost of the wireless network. Gartner Dataquest believes that end users will download music and audio files via a desktop or wired connection then transfer the files via USB or Bluetooth to the wireless device. Longer term, as the higher-speed packet data services come online, the option of wireless download does become more compelling, but the pricing of the data services will have a lot to do with whether or not end users embrace the service. Obviously, terminal support is a critical success factor for this application area.

The possibility of some additional traffic within the newer networks (the always-on connection or some of the packet data networks) can take advantage of slow network time to more effectively push audio files out to the device, but we do not expect that the traffic volume will be significant until the pricing of these service is deemed competitive to wireline alternatives.

Home Automation

Gartner Dataquest believes the home automation market is in its infancy now. A number of applications can be seen as useful:

- Having remote control over your security system to let people into your house when you are not there
- Turning on your air conditioner before you get to your house
- Using the voice recognition or a PDA to program your favorite TV show on the VCR

All of these applications may be valuable, but to make them work there must be some type of radio link to the appliance, whether it be Bluetooth, WLAN or cellular radio. In addition, there must be customer education. Because of these factors, Gartner Dataquest does not expect the mass adoption of home automation solutions over the next five years.

However, there will likely be some adoption of home automation by appliance manufacturers that want a way to have contact with customers, gain more revenue, and be able to monitor the appliance for life cycle repairs, save time for repair people, and get customers to buy updated models. In addition, high-end security systems built with wireless connectivity over the next five years is a possibility as well.

Gartner Dataquest expects the number of wireless subscribers using home automation service applications to grow from zero in 2000 to 30,000 in 2005, and service provider revenue is expected to grow from nothing in 2000 to $271,000 in 2005.

Some testing and standards initiatives in the United States and abroad show home automation is on the industry radar screen.

In the United Kingdom, Orange has set up an initiative called "Orange-at-home." Orange has worked with more than 80 suppliers for systems and appliances that Orange integrated into its demo wirefree home. At present, Sony and Phillips are working on standards for this arena.

In addition, several appliance manufacturers such as Carrier, Whirlpool, General Electric, Maytag and Merloni (Europe's third-largest home appliance manufacturer) have been testing wireless controls with Web-enabled appliances for several years, with wireless control as part of the mix. In some cases, appliance manufacturers have partnered with power companies for application that allow the power company to change the temperature during peak hours, saving money on electric bills and easing the strain on the power grid. These applications also allow customers to remote control their thermostats by using a wireless browser or a desktop.

Entertainment

Ring tones are the leading application in this space, but simple image download and brief cartoons will rapidly grow as services and devices to support these come to market. Entertainment options are relatively limited because of the networks' support and the available devices; however, higher bandwidth, always-on packet networks coupled with faster, memory-rich color phones other mobile terminals will add to the possible mobile entertainment options. In Europe, numerous third-party distributors of entertainment content have surfaced and distributed ring tones and simple graphics via SMS. Gartner Dataquest expects that similar vendors will surface here as standards and devices come to market. One factor slowing the usage of entertainment-based services is the carrier's reluctance to allow third-party vendors network access or even billing/comarketing arrangements. Additionally, devices that support downloadable ringers and graphics have only recently become available from non-GSM carriers such as Sprint PCS and Verizon.

For entertainment, Gartner Dataquest expects to see two distinct revenue models: portal and carrier-based. The portals will consolidate content from multiple sources and sell it to users for a transaction fee, while the carrier-based content aggregation will likely follow a subscription-based pricing model based on a user's stated interests. Unlike it is in Europe, distribution will likely occur over the packet-based networks, not via SMS, and users will be billed for airtime and the content costs (see Table 5-5).

Table 5-5
Mobile Entertainment Revenue in the United States, 2000-2005

	2000	2001	2002	2003	2004	2005
Revenue ($)	3,600,000	10,800,000	31,200,000	144,000,000	420,000,000	876,000,000

Source: Gartner Dataquest (April 2002)

Games

Gaming is one area that Gartner Dataquest believes will experience significant revenue growth over the next four years; in particular, games that involve combination and community will be very strong revenue generators for carriers. Some examples of these games are multiplayer adventure games such as "Gladiator" or trivia and game show-based games (for example, "Trivial Pursuit" and "Who Wants to Be a Millionaire") that enable head-to-head or multiplayer competition.

Two separate types of games are those that are downloaded to the handset and played with or without network support and those that have a client element on the terminal but also require a network connection to foster the multiplayer or competitive aspect of the game. The majority of the games on the market are simple, handset-based games such as "Snake" and "Blackjack" that do not require a network connection. However, we expect that network-based mutiplayer games will rapidly gain popularity and become the more common type. Higher-speed data networks and location enhancements will also add to the gaming experience, driving up the number of users and the ARPUs of those users. The dynamic that we have modeled is one with high-intensity gamers in the majority at the beginning of the uptake cycle driving up ARPUs, and those ARPUs evening out over time as less-frequent gamers enter the market and become the majority (see Table 5-6).

Table 5-6
Mobile Gaming ARPUs in the United States, 2000-2005

	2000	2001	2002	2003	2004	2005
ARPUs ($)	2.00	2.20	2.40	2.50	2.25	2.00

Source: Gartner Dataquest (April 2002)

Motorola, Nokia and Digital Bridges are a few of the leaders in the game distribution space with carrier and developer relations. In terms of game production, most of the popular games are from smaller production houses such as CodeOnline and SpringToys, although Gartner Dataquest expects vendors such as EAsports to quickly enter this space as gaming-specific standards and terminals are developed.

Customer Service

Wireless customer care is in the beginning stages of development. However, it has already shown to be popular with a number of carriers as a way to reduce costs and increase revenue. With wireless customer care, WAP and SMS users can have access to and payment of their monthly bills, determining the total number of minutes of use for that month, getting automatic wireless usage evaluation, moving to different pricing plans, purchasing additional services and getting alerts on upgradable functionalities. The basic premise of cost savings is to limit customer-services calls, and the basic premise for revenue generating is the convenient upselling or accessory selling.

One of the leaders in this area is Davinci Technologies. They have signed eight carriers in North America for various wireless customer care services. The two that have been formally announced are Bell Mobility in Canada and Qwest Wireless. The main attraction for carriers is cost savings. Other companies that offer customer care features such as balance accounting for the prepaid market include Boston Communications, Ericsson, Intervoice-Brite and Corsair.

Gartner Dataquest expects the market for wireless subscribers using wireless customer care will grow significantly over the next couple of years.

Gartner Dataquest expects the number of wireless subscribers using customer service applications to grow from 20,000 in 2000 to 25 million in 2005, with a CAGR of 372.87 percent between 2000 and 2005. There will be little or no direct revenue from this application and the gains will come from upselling products and cost.

Advertising

Gartner Dataquest expects that wireless advertising will start off slowly in the United States and increase as more subscribers have wireless data handsets and as the medium of advertising is accepted in the wireless channel. Gartner Dataquest expects the number of wireless subscribers receiving wireless advertisements to grow from 100,000 in 2000 to 48 million in 2005, with a CAGR of 199.07 percent between 2000 and 2005. Service provider revenue is expected to grow from $10,000 in 2000 to $336.1 million in 2005, with a CAGR of 704.74 percent between 2000 and 2005. Carriers will gain revenue by advertising on their own portal as well as gaining a portion of the content providers' ad revenue if they access the content provider via the carrier portal. In addition, carriers can advertise their own services to cross-sell and upsell users on more advanced features.

Wireless advertising offers a number of key benefits:

- Good click-through rate (wireless advertisers are seeing 3 percent and higher); the wireless device can provide one-click access to the company advertising via a phone call or the wireless Web
- Brand awareness
- A targeted audience based on carrier information
- Small screen provides directed attention to the advertisement

There are deterrents to wireless advertising as well. With wireless advertising, carriers will be walking a fine line between giving the end users what they want or will accept and turning them off completely. The end user must get some type of benefit to receive an advertisement. That benefit can be a content (such as news, information and entertainment), a discount on desired goods, free airtime, and free games or frequent flyer miles. End users in general have accepted this paradigm and will do so for wireless as well. In addition, the more personalized the advertisement, the better received it will be by the end user.

A subsegment of the user population will not want advertisements, and the carrier must allow this group to opt out of advertising on the device. This may not be a trivial exercise, as NTT DoCoMo has run into a junk mail problem with its I-mode service in Japan, and in the United States, Verizon had to reach a settlement with Acacia National Mortgage Company in Colorado to stop "spamming" its customers.

Several other technological advances should benefit wireless advertising, including color screens, larger screens, and voice and graphics advertisements.

Wireless advertising has not reached mainstream attention. The two largest players in wireless advertising are Windwire and Skygo. Wireless service providers that have promoted advertising include Leap Wireless (Via Voice), Cingular and AT&T Wireless.

Still, wireless advertising has caught the attention of some of the leading consumer goods and food companies, including Nestlé, McDonald's, and Procter & Gamble, and some larger U.S. newspapers, including The New York Times, the Seattle Post-Intelligencer, the Los Angeles Daily News, The Arizona Republic, The Star Tribune in Minneapolis, The Daily Oklahoman's Oklahoman.com, The Florida Times-Union, the St. Petersburg Times, The Virginian-Pilot and The Free Lance-Star. The consumer goods and food companies are trialing the interactive, sales promotion and brand-building potential of the wireless channel. The newspapers have launched a pilot program with Aether Systems to find out how best to serve their readership via wireless including ad participation. Other entities that have used wireless advertisements include AT&T, MTV, Midway Airlines, Sephora and the National Hockey League's Carolina Hurricanes, Excite Mobile, Go2Systems and The Sporting News.

M-Couponing

M-Couponing is the promotion sister of wireless advertising. An end user can receive a message from a merchant offering a coupon or a discount if that service is purchased. That discount can be dependent on restrictions such as a specific product or a specific time frame for the purchase. The carrier will be paid a transport fee for these messages, but could receive other fees for services rendered such as customer profiles or location-specific information.

Gartner Dataquest expects the number of wireless subscribers receiving wireless advertisements to grow from zero in 2000 to 10 million in 2005. Service provider revenue is expected to grow from nothing in 2000 to $164.75 million in 2005. The largest drivers are the end-users' acceptance of this type of promotion alert systems, and in the introductions of incentives to motivate accepting coupons on wireless devices.

With m-couponing, carriers walk a fine line between offering acceptable advertising to the end user and annoying the end user. The end user must buy in to receive m-coupons, whether it is via the company sending the coupons or through some type of incentives that will allow merchants to send m-coupons based on demographic characteristics.

Several companies have successfully tried m-couponing, including New Line Cinema in New York City and the National Hockey League's Carolina Hurricanes. Dunkin' Donuts offered a successful couponing event in Italy with SMS. Some of the benefits of m-couponing are:

- They can increase the response rate over paper coupons.
- They reach target groups that do not typically use paper coupons.
- They allow for a quick response regarding the purchased item in some cases (such as tickets).

The two target groups for these services are people who do not typically bother with paper-based coupons, including people on the move, "techophites" and teen-agers. The other group is people who currently use paper coupons. Wireless service providers can make m-couponing more attractive to this group by allowing them to store a coupon on the network service, organize coupons, and provide devices that can interface with store computers and cash registers (for example, Bluetooth) to make the coupon entry process more efficient.

M-couponing has worked on a small scale, but there have been cases when it has not worked well, as employees were unaware of the promotion and would not redeem the coupons. Successful m-couponing requires training of employees and a system to verify that the coupon is valid. Employees are generally going to err on the side of caution when it comes to promotions.

Appendix A
Glossary of Terms

Table A-1 lists the definitions of the acronyms and abbreviations that appear in this report.

Table A-1
Report Glossary

Acronym/Abbreviation	Definition
2G	second generation
3G	third generation
ARPU	average revenue per user
ASP	application service provider
ATM	automatic teller machine
B2C	business to consumer
CAGR	compound annual growth rate
CDPD	cellular digital packet data
ERM	employee relationship management
GSA	General Services Administration
GSM	Global System for Mobile Communications
HVAC	heating, ventilation and air conditioning
IM	instant messaging
IT	information technology
LAN	local-area network
MDSI	Mobile Data Systems Integrators
MLS	mobile local switching
NA	not applicable
PDA	personal digital assistant
PIM	personal information management
RIM	Reasearch in Motion
ROI	return on investment
SMS	short-message service
TV	television
USB	universal serial bus
VCR	video cassette recorder
WAN	wide-area network
WAP	wireless access protocol
WLAN	wireless local-area network

Source: Gartner Dataquest (April 2002)

