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This study was compiled over a period of several months from interviews and research. Because technology is constantly evolving, the information herein may contain errors or omissions. Every attempt was made to provide accurate information. The companies profiled neither officially endorse nor necessarily agree with this study. The opinions stated herein are those of the author and therefore represent his view of the current market condition and trends.



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#### Introduction

A business traveler arrives at his destination and checks his wireless phone for transportation options. A family on holiday uses their mobile phone to navigate the streets of Rome. A hotel general manager greets a returning business traveler with a customized Web message on her smartphone that provides her with a list of local restaurants ideal for business meetings. A travel agent sends a multimedia coupon to a client's mobile phone offering a discount coupon on a dinner cruise while the client is in Hawaii. There is no doubt that wireless applications for the travel industry will have a dramatic impact on the travel experience.

No single technology has more promise and has been more hyped than mobile communication. Since the introduction of the i-mode phone in Japan in the late 1990s, the travel industry has been anxiously anticipating the always-on, always-connected traveler. In early 2000 most experts predicted that wireless communication would be the next technology boom. The combination of the bursting of the dot-com bubble and the economic downturn that followed the 9/11 terrorist attacks has caused many to believe that the promised wireless wave is nothing but hype. This pessimistic view is not only inaccurate, but it also misses the tremendous opportunity for the travel supplier, travel intermediary, and corporate manager in this new always-connected environment.

The wireless industry has its own unique set of terms: GSM, CDMA2000, Wi-Fi, Bluetooth, to name just a few. The important thing to keep in mind is not the flavor of technology, but the ultimate goal of all wireless initiatives: keeping people connected via a broadband mobile multimedia environment. This study will focus on the underlying technology trends driving the wireless industry and, more important, it will address the way these new technologies will revolutionize the travel industry. Mobile technology and travel naturally fit together. Little has been done to connect travelers with information while they are on a trip. The new network infrastructure, which is emerging, combined with next-generation smartphones, will permanently change the travel experience.



#### Background

The Gartner Group has applied its "technology hype cycle" theory to the mobile telecommunications industry, describing a specific mobile technology hype cycle (Table 1)<sup>1</sup> The hype around any new technology quickly intensifies as the market embraces new terms and new concepts. In the mobile telecommunications industry the excitement about the ultimate vision of a fourth-generation (4G) digital network capable of wireless streaming video began to reach a fever pitch in early 2000, about the same time the Internet bubble was developing, and was often cited as the next wave of technology innovation. The bursting of that bubble in March 2001 coupled with the economic downturn and profitability questions concerning telecommunication companies caused the hype to quickly turn into market skepticism. During the past 12-18 months, the emergence of location-based services and the deployment of 2.5G networks and technology such as Bluetooth, Wi-Fi, and smartphones are triggering a resurgence of interest as the market moves toward maturity. As of this writing we are in the midst of a rapid growth in wireless local area networks (WLANs), the use of short message service (SMS), the introduction of multimedia



<sup>1</sup> Gartner Inc. Publication, Philip Redman, William Clark, and Ken Dulaney. *Hype Cycle for Mobile and Wireless Applications and Services*, 2003. May 30, 2003. <u>http://www3.gartner.com/Init</u>.



messaging service (MMS), and the early deployment of next-generation networks and mobile phones.

It is in that context that this study analyzes the emerging mobile technologies and their impact on the global travel industry. By definition, the traveler is mobile and thus the correlation between the technology and the industry is obvious. Research indicates that the relationship goes beyond this common wisdom, and in fact the frequent traveler is the early adopter of new mobile technology. For example, there is a clear correlation between frequent travelers and next-generation smartphone and wireless personal data assistant (PDA) use. Here is a sampling of research that supports that premise.

#### Wireless PDA Travel Survey

The following are results of the 2003 My AvantGo Travel Survey of wireless travel preferences<sup>2</sup>:

- One-third of respondents report that they purchased 100 percent of their travel online last year.
- 65 percent of survey participants would be interested in receiving travel discounts on their PDAs, while 67 percent desire flight delay notifications via mobile devices.
- Travelers are most interested in mobile access to flight-delay alerts, airline schedules, driving directions, weather updates, and airport maps.

This survey was conducted entirely via mobile devices to subscribers of AvantGo, a company that provides interactive and personalized content and applications to handheld and Internet -enabled phone users.

#### The Connected Traveler

According to a 2002 survey released by Yesawich, Pepperdine & Brown, travelers tend to be highly connected<sup>3</sup>:



- 80 percent of business travelers bring along a cell phone.
- 40 percent regularly carry a laptop.
- 25 percent own a PDA.

According to a survey by American Express conducted in October 2002, "The vast majority of travelers consider cellular phones a premier on-the-road communication tool. Asked how key it is to have access to mobile phones while traveling, 81 percent said very or quite important, while



only 19 percent said not very or not at all important." <sup>4</sup>

Last year In-Stat/MDR conducted a survey of wireless LAN early adopters highlighting the primary application used by these early adopters.<sup>5</sup> In-Stat/MDR research reported the following (see Table 2):

 The top three places survey respondents use the WLAN service are airports, hotels, and

<sup>2</sup> m-Travel article, "Survey shows Travelers Want More PDA Services." April 24, 2003. http://www.m-travel.com/30424.shtml.

<sup>3</sup> *Star Tribune,* "Road Warriors Find New Ways To Stay in Touch With Family." October 28, 2002. http://www.nwtm.com/ClientGateway/newsIndustryNews/IndustryNesArchive/2002/11-02IndustryNews/11-02NewsIndArticles/11-02RoadWarriorsFindNewWays.htm.

<sup>4</sup> American Express press release, "International Business Travelers Optimistic About Travel for 2003, New American Survey Shows." October 9, 2002.

http://home3.american express.com/latestnews/biz-travel-optimism.asp.

<sup>5</sup> Instat press release, "Early Mobile Internet Adopters Could Power Market for Public WLAN Services." June 3, 2002. <u>http://www.instat.com/newmk.asp?ID=229</u>.



convention centers-the most important spots for business travelers.

 98 percent of respondents cited e-mail as a top application for use through public WLAN access.

This is a global phenomenon. For a study of U.K. travelers commissioned by Vodafone, Continental Research polled 201 managing directors, financial directors, and other senior managers of businesses with an annual turnover of between £1 million and £100 million.<sup>6</sup> The following are key results of the survey:

- 32 percent of people questioned said they regularly travel abroad for work purposes.
- 48 percent of people said that their mobile phone is the one item they cannot live without while traveling abroad.

#### The Growth of Smartphones

- According to research firm IDC, shipments of smartphones will increase at a compound annual growth rate of 17 percent, from 14.6 million in 2001 to 31.6 million by 2006.<sup>7</sup>
- According to an In-Stat/MDR forecast, worldwide shipments of converged devices (smartphones) will reach almost 63 million in 2006 (see Table 3).<sup>8</sup>
- In a June10, 2003, interview a senior executive from



<sup>&</sup>lt;sup>8</sup> InfoTechTrends Web site, *"*Smartphones Forecast to Reach 650(mil) by 2006." December 20, 2002. <u>http://www.infotechtrends.com/smartphones\_analysis.htm</u>.



<sup>&</sup>lt;sup>6</sup> mTravel.com article, 'British Business Travelers Love Their Mobile Phones." April 29, 2002. <u>http://www.m-travel.com/20429.shtml</u>.

<sup>&</sup>lt;sup>7</sup> Cellular News article, "Smartphone Sales to Hit 63 Million Units by 2006—Report." May 9, 2002. <u>http://www.cellular-news.com/story/6676.shtml</u>.

Motorola said that 85 percent of the phones set for launch this year will be color and between 40 percent and 45 percent will be camera phones.<sup>9</sup>

As available research from the telecommunications and travel industries is reviewed, it becomes very clear that frequent travelers will be early adopters of next-generation smartphones and wireless PDA technology. The mobile phone seems to be an essential device for the frequent traveler. As convergence between PDA and mobile phones continues to accelerate, it is clear that travelers will soon benefit from the expanded functionality of next-generation smartphones.

#### A Brief History <sup>10</sup>

#### The Origins of Wireless Technology

It wasn't that long ago that the average consumer needed to install a bulky, expensive unit in their car to enable "mobile" communication. Advancements in both handset size and functionality and the maturation of wireless network technology have drastically changed the mobile communications experience. To understand where mobile travel commerce is heading, it is important to have a basic understanding of the history of wireless technology.

The basic concept of cellular phones originated in 1947 when researchers looked at crude mobile (car) phones and realized that by using small cells (range of service area) with frequency reuse they could increase the traffic capacity substantially. However, at that time, the technology did not exist. The Federal Communications Commission (FCC) regulates broadcast as well as any message sent over the airwaves. A cell phone is a type of two-way radio. In 1947 AT&T proposed that the FCC allocate a large number of radio-spectrum frequencies so that widespread mobile telephone service would become feasible. The FCC decided to limit the number of frequencies available in 1947. With these limits only 23 phone conversations were possible simultaneously in the same service area, a decision that provided little incentive for research.

<sup>&</sup>lt;sup>10</sup> Mary Bellis.. Article on About.com, "Selling the Cell Phone, History of Mobile Phone." <u>http://inventors.about.com/library/weekly/aa070899.htm</u>.



<sup>&</sup>lt;sup>9</sup> *USA Today, "*Motorola to Introduce New Cell Phones." June 10, 2003. http://www.usatoday.com/tech/techinvestor/techcorporatenews/2003-06-10-motorola-phones\_x.htm.

The development of the integrated circuit in 1958 at Texas Instruments revolutionized the electronics industry, making it possible to design and build smaller portable devices. Meanwhile in 1967 in Finland, the Nokia group was formed by consolidating two companies: the Finnish Rubber Works and the Finnish Cable Works, which expanded its electronics division to include semiconductor research. In the 1970s Nokia research was instrumental in the development of digital landline telephone switches. Finland's free market for telecommunications equipment created a climate that promoted creativity and competitiveness, which helped Nokia's later cellular development.

In 1971 Intel introduced its first microprocessor, the 4004. Designed originally for a desktop calculator, the microprocessor was soon improved and quickly put into all fields of electronics, including cell phones. Motorola was the first to incorporate the technology into a portable device

designed for use outside an automobile.



Dr Martin Cooper, a former general manager for the systems division at Motorola, is considered the inventor of the first modern portable handset. Cooper made the first call on a portable cell phone in April 1973. He made the call to his rival, Joel Engel, Bell Labs head of research.

By 1977, AT&T and Bell Labs had constructed a prototype cellular system. A year later public trials of the new system were started in Chicago with over 2,000 trial customers. In 1979, in a separate venture, the first commercial cellular telephone system began operation in Tokyo. In 1981 Motorola and American Radio telephone started a second U.S. cellular radio-telephone system test in the Washington/Baltimore area. By 1982 the slow-moving FCC finally authorized commercial cellular service for the United States. A year later the first American commercial analog cellular service, or advanced mobile phone service (AMPS), was made available in Chicago by Ameritech. Worldwide commercial AMPS deployment followed quickly. An 88-cell system in Tokyo was put into operation in December 1979 using Matsushita and NEC equipment. Europe saw cellular service introduced in 1981 when the Nordic mobile telephone system, began



operating in Denmark, Sweden, Finland, and Norway in the 450 MHz range. It was the first multinational cellular system.

The analog systems in the United States allowed the user to roam from one city or state, a process that was very difficult in Europe. In the United States little desire existed to design an alldigital system when the present one was working well and was popular. In fact, the American cellular phone industry grew from less than 204,000 subscribers in 1985 to 1.6 million in 1988. And with each analog-based phone sold, chances dimmed for an all-digital future.

Europeans had a different viewpoint. No new telephone system could accommodate their existing services on so many frequencies. They decided instead to start a new technology in a new radio band. Cellular structured, but fully digital, the new service would incorporate the best thinking of the time. They patterned their new wireless standard after landline requirements for integrated services digital network, hoping to make a wireless counterpart to it. The new service was called global system for mobile communications (GSM).

In the early 1990s cellular telephones were deployed worldwide, but development remained concentrated in three areas: Scandinavia, the United States, and Japan. By the mid-1990s telecom deregulation occurring across the globe and the private market opened up a wide variety of wireless services. The leading technology in America in the 1990s was IS-54, whereas GSM dominated Europe and many other countries. Japan went in a slightly different direction, with Japanese digital cellular (or personal digital cellular) in 1991 and the personal handyphone system in 1995.

To accommodate more traffic in a limited amount of radio spectrum, the industry developed a new set of digital wireless technologies called time division multiple access (TDMA). TDMA used a time-sharing protocol to provide three to four times more capacity than analog systems. But just as TDMA was being standardized, Qualcomm Corporation developed a competing technology called code-division multiple access (CDMA). CDMA is a digital cellular technology that uses spread-spectrum techniques. Unlike GSM and TDMA, CDMA does not assign a specific



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frequency to each user. Instead, every channel uses the full available spectrum. During the past few years many carriers have replaced TDMA with CDMA to increase call capacity while retaining the same service.<sup>11</sup>

#### 2.5 G Networks

When the wireless industry realized that it was going to be costly and technologically challenging to upgrade to third-generation (3G) networks, which promised greater bandwidth for voice and data communications, an interim stage emerged called 2.5G. These networks transfer data at speeds of up to 114Kbps, which is faster than traditional digital (2G) networks and can be always connected. A phone with 2.5G services can alternate between using the Net, sending or receiving text messages, and making phone calls, without losing its connection.

While Japan and Europe have had 2.5G services since 2000, the United States began making these same services available in late 2001. The dominant 2.5G technology is general packet radio service (GPRS), which is always on and gives users a connection to the Internet and e-mail. The GPRS is a non-voice value-added service that allows information to be sent and received across a mobile telephone network.

#### 2.5G in the United States

The United States lags behind the rest of the world in wireless technologies for a number of reasons. The telecommunications infrastructure in the United States is more developed than in many European and Asian countries. As a result, the demand for wireless devices has been lower in the United States because consumers have other low-cost options. Also, the United States has a number of competing technical standards for digital services, whereas European and Asian countries are predominately centered on one group of standards in the GSM family. Although wireless data services are slower than in Europe, they are becoming more popular in the United States. For example, in January 2003, AT&T Wireless said that 30 percent of

<sup>&</sup>lt;sup>11</sup> Cellular Online, "Latest Global, Handset, Base Station, & Regional Cellular Statistics." August 2003. <u>http://www.cellular.co.za/stats/stats-main.htm</u>.



customers who were signing up for voice service added data services to their selections. The company estimates that more than 3 million of its customers are active data users, and each customer adds about \$8 in additional revenue per month. AT&T Wireless processed 240 million text messages in December 2002.<sup>12</sup> Sprint PCS pegged adoption rates for its PCS Vision data services at much better than 30 percent and expects that when interoperable multimedia messaging becomes widely available in the United States, companies will see additional growth in data services.<sup>13</sup>

#### **3G Networks**

Since the late 1990s the entire global telecommunication industry has been anxiously projecting the arrival of 3G networks. 3G licenses have been awarded around the globe and in many cases at a huge cost, necessitating that existing mobile communications companies in the 2G space to justify their continued existence. Many industry analysts have questioned the return on investment in 3G technologies, speculating whether the network operators will be able to earn an adequate return on the capital deployed in acquiring and rolling out a 3G network. Table 4 describes the evolution of wireless networks, their year of introduction, cellular protocol, and data speed.<sup>14</sup>

Generation	Year	Cellular Protocol	Connection Type	Data Speed
1	1983	AMPS	Circuit Switched	9.6 kbps
2	1991	GSM	Circuit Switched	9.6 kbps
2	1993	TDMA	Circuit Switched	9.6 kbps
2	1994	IDEN	Circuit Switched	9.6 kbps
2	1996	CDMA 95A	Circuit Switched	14.4 kbps
2	1999	CDMA 95B	Circuit Switched	114 kbps
2.5	2001	IDEN	Packet Switched	19.2 kbps
2.5	2001	GSM GPRS	Packet Switched	86 kbps
2.5	2002	CDMA IMT2000 MC 1X	Packet Switched	307 kbps
2.75	2004	GSM EDGE	Packet Switched	384 kbps
3	2005	CDMA IMT2000 MC 3X	Packet Switched	2000 kbps
3	2005	IMT2000 DS	Packet Switched	2000 kbps

#### **Cellular Network Migration**



Table 5<sup>15</sup> shows the migration path from the TDMA, GSM, personal digital cellular, and CDMA 2G platforms to the 2.5G and 3G environments.





Table 6 shows the current 3G migration plans for the major networks in the United States.<sup>16</sup>

#### Table 6

Network	Verizon	Cingular	Sprint PCS	AT&T Wireless	Nextel	T-Mobile
2G	CDMA	TDMA/GSM	CDMA	TDMA	IDEN/TDMA	GSM
2.5/3G Migration	CDMA 2000 to EDGE	GSM/GPRS to EDGE	CDMA2000	GSM/GPRS to EDGE	TBD	GSN/GPRS

<sup>15</sup> 3G Web site, "The Universe Is a Cloud." May 3, 2002.

http://www.3g.co.uk/PR/May2002/3309.htm.

<sup>&</sup>lt;sup>16</sup> Future Quest Wireless Inc. Web site, *"*Wireless Carriers Overview." http://www.futurequest.biz/carriersoverview.htm.



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In the United States and Europe, the migration to 3G networks has continued to be slower than originally projected. For example, in March 2003 AT&T Wireless and NTT DoCoMo announced that they are scaling back plans to deploy wideband-CDMA, (W-CDMA) technology because of concerns regarding cost, technical readiness, and demand.

#### **Global View**

#### Introduction

The evolution of wireless communications from analog to digital to broadband has taken longer and cost more money than most industry observers believed. At the same time WLAN "hotspots" are emerging rapidly, particularly in airports and hotels. To understand the direction of mobile technology, it is essential to take a global view.

#### Asia

#### Japan



Japan has long been the model for mobile communications. The three key players in Japan's mobile telecommunications market are NTT DoCoMo, KDDI/AU, and J-Phone.

NTT DoCoMo's I-Mode

In February 1999 NTT DoCoMo launched a new and truly groundbreaking product: i-mode, a system that turned cell phones into a personal network connection. The service gave subscribers information exactly when and where they wanted it, while providing businesses with a direct channel to consumers at the precise point of potential purchase.

Soon after the shift from analog to digital technology in the early 1990s, NTT DoCoMo developed Japan's first mobile "packet" based, non-voice mobile communications service called DoPa. Anticipating that the cellular phone market would soon become saturated, and seeing that DoPa was a success, NTT DoCoMo stepped up its efforts to build on the success of DoPa and develop



a new mobile data communications service for individuals. I-mode, created in 1999, rapidly achieved an unparalleled level of acceptance. By December 2002 i-mode was an integral part of the business and personal lives of 36 million NTT DoCoMo customers. I-mode allows cellular phone users access to more than 62,000 Internet sites, as well as specialized services such as email, online shopping and banking, ticket reservations, and restaurant advice. Users can access sites from anywhere in Japan. Charges are based on the volume of data transmitted, not the



13D Homerun King A 3D baseball game lets subscribers hit home runs<sup>1</sup>



Pokemon Hiroba Always carry your favorite Pokemon on your display screen and enjoy Pokemon melodies



Disney Sports Soccer, skateboarding and other games featuring Disney characters<sup>2</sup> amount of time spent connected. It is important to note that i-mode is an information and entertainment service enabled by DoCoMo's wireless technology. The "i" stands for information, not the Internet. Content comes from independently

developed sites approved and monitored by DoCoMo. I-mode exists as a premium or add-on service to a customer's regular cellular bill. I-mode's expensive mobile phones are phone and data terminals in one. DoCoMo's conventional cellular radio channels handle voice traffic, while data is transmitted over a packet switched network. The success of i-mode has influenced mobile development worldwide, as many have viewed it as the model for the future. The i-mode service could be thought of in terms of a corporate intranet run by DoCoMo, rather than a true Web experience. To be viewed on i-mode phones, a site needs to be written in a stripped-down version of HTML. Large companies such as Disney have i-mode-compatible sites; a normal Web site 'won't display or operate properly on an i-mode phone.

#### NTT DoCoMo and 3G

In October 2001 NTT DoCoMo launched its 3G wireless network, Freedom of Mobile multimedia Access (FOMA). DoCoMo's 3G service offers video conferencing and speedy Web access, but until recently met a cool reception because of poor phone battery life, a limited coverage area, and pricey handsets. Demand showed signs of picking up earlier this year after the company



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launched three new 3G handsets with longer battery life and began actively expanding its coverage area. Though initial results from DoCoMo's introduction of 3G wireless services were disappointing, Japanese consumers are now lining up to buy phones that run on its nearly complete FOMA network. NTT DoCoMo has raised its sales target to one million customers for the service by March 2004. The company also has taken the lead in camera-phone sales in Japan. <sup>17</sup> NTT DoCoMo announced that from September 6, 2003 the service area for DoCoMo's FOMA 3G mobile phones will cover 99% of the population in the Kanto-Koshinetsu region. Its eight regional subsidiaries will also expand the FOMA service area to 96% of the population nationwide by the end of September.<sup>18</sup>

#### KDDI

KDDI Corporation is the second largest telecommunications carrier in Japan. It provides local, domestic, long-distance, and international fixed-line as well as mobile telecommunications services nationwide. It also offers Internet and Internet Protocol (IP) services. It launched CDMA2000 1x third-generation (3G) cellular phone services in April 2002. Originally called Kokusai Denshin Denwa, the company was established in 1984 and changed its name to DDI Corporation in1985. In October 2000 it merged with international carrier KDD Corporation and mobile operator IDO Corp and was renamed KDDI Corporation in April 2001. <sup>19</sup> In September 2002 KDDI began offering a service called "Movie Mail" that allows users to take seamless movies of up to 15 seconds and send them as e-mail attachments. On, March 9, 2003, KDDI announced that the cumulative number of Movie Mail-compatible handset users surpassed the one million mark.

<sup>19</sup> KDDI Corporate Website "History" http://www.kddi.com/english/corporate/kddi/history/index.html



 <sup>&</sup>lt;sup>17</sup> NTT DoCoMo Website " 3G/FOMA" http://www.nttdocomo.com/corebiz/foma/index.html
<sup>18</sup> 3G Newsroom.om "NTT DoCoMo to expand FOMA 3G service area" September 3, 2003 http://www.3gnewsroom.com/3g\_news/sep\_03/news\_3701.shtml

#### J-Phone

Japan Telecom (JT) is 67 percent owned by U.K.–based Vodafone. Established in 1984 by Japan Railways, the company provides voice and data services over fiber optic networks that run along railway lines owned by members of the Japan Railway group. JT is the third largest provider of fixed-line services in Japan. Its mobile subsidiary, J-Phone, is the third largest provider of mobile telephony services. J-Phone offers ""Sha-mail""picture messaging, "Movie Sha-mail""video messaging, "J-SKY" mobile Internet and e-mail access, and Java applications. The company has more than 13 million customers, 62 percent of which are Sha-mail users and 87 percent J-SKY subscribers. <sup>20</sup> J-Phone was awarded one of three licenses to operate 3G mobile services in Japan and launched a commercial 3G W-CDMA service on December 20, 2002. On September 5, 2003 J-Phone officially changed its name to Vodaphone KK. <sup>21</sup>

#### China

China, currently the largest mobile communications market in the world, is adding additional services as the number of mobile phone users soars from the current figure of 160 million to 280 million by 2005. More Chinese phone users are abandoning their fixed lines for mobile handsets in 2003. According to China's Ministry of Information Industry, China added a total of 5.09 million new mobile phone subscribers in March 2003. This puts China's total number of mobile subscribers at 221.5 million. However, the growth rate for the first quarter slowed in comparison with last year. New mobile phone users increased by an average of 4.95 million a month in the first quarter of 2003 compared with 5.11 million in the same period in 2002. The number of mobile phone users will increase by as much as 25 percent, to 258 million, this year. As the Chinese become more familiar with mobile devices, they are discarding traditional fixed-line phones for

 <sup>&</sup>lt;sup>21</sup> J-Phone, Vodaphone Website "J-Phone to change company name to Vodaphone" Sepember
5, 2003 http://www.vodafone.jp/english/release/2003/030905e.pdf



<sup>&</sup>lt;sup>20</sup> J-Phone, Vodaphone Website "J-Phone Unveils the JSA-06 Sha-mail Handset" http://www.vodafone.jp/english/release/2003/030708e.pdf

mobile handsets that can make calls, surf the Internet, send digital photographs, and write short messages.<sup>22</sup>

#### South Korea

With a 62 percent penetration rate and a single technology standard (CDMA) the South Korean wireless market is one of the most highly evolved in the world. <sup>23</sup> Almost 40 percent of cellular users subscribe to some form of mobile data service. SK Telecom controls about half the South Korean mobile market and saw its subscriber base increase to 16.5 million users at the end of June 2002 compared with 16 million users at the end of March 2002. <sup>24</sup>



#### The Philippines

The Philippines is a country of 7,017 islands that span an area of 1,840 km (1,143 miles) from north to south. This geography, plus the country's determination to leapfrog to

new telecommunications technology without laying miles of cable, has made wireless solutions much more attractive for the 70 million residents and, thus, the wireless phone market is booming. There are approximately 2.7 million users, and 200 to 300 more people sign up every month. Using mobile phones for text messaging has truly caught the Filipino imagination. In fact, the use of text messaging has taken off to such an extent that the occurrence has been included in the *Guinness Book of Records*. An astounding 18 million messages are being recorded every day. "On January 20, 2001, President Joseph Estrada of the Philippines became the first head of state in history to lose power to people who didn't know each other, but worked in concert to organize using mobile messaging technology. More than one million Manila residents, mobilized and coordinated by waves of text messages, assembled at the site of the 1986 ""People

<sup>&</sup>lt;sup>24</sup> BBC Interactive "Korea Enjoys Mobile Internet Boom" July 15, 2002 http://news.bbc.co.uk/1/hi/business/2128842.stm



<sup>&</sup>lt;sup>22</sup> Wireless Newsfactor, "Why China's Wireless Market is So Hot" August 5, 2002 http://wirelessnewsfactor.com/perl/story/18856.html

 <sup>&</sup>lt;sup>23</sup> Sue Marek, Wireless Week "Lessons From Korea" May 2, 2002
http://www.wirelessweek.com/index.asp?layout=document&doc\_id=84247&verticalid=42&vertical
=Global%20Regions&industry=Asia+Pacific&text=korea

Power""peaceful demonstrations that had toppled the Marcos regime. Tens of thousands of Filipinos converged on Epifanio de los Santas Avenue (known as "Edsa)" within an hour of the first text-message volleys. Over four days, more than a million citizens showed up."<sup>25</sup>

#### Europe

With the introduction of GSM technology in the early 1990s, Europe took the lead in digital communications. Although Europe is not a single culture or destination, the common GSM platform has enabled Europeans to quickly take advantage of advancements in wireless digital technology across Western Europe. For example, the use of SMS and data on GPRS networks has become commonplace. The GSM network has not only become the standard for Western Europe, but for most of the world. Unfortunately, the cost and pace of implementation of 3G networks have disappointed many Europeans.

#### The 3G Dilemma

The 3G digital mobile telephone system in Europe is the universal mobile telecommunications system (UMTS), which is based on W-CMDA technology. It is estimated that between £110 - £150 billion has been paid for 3G licenses by various telecommunication operators in Europe. This cost covered only the licensing fee, as carriers face similar costs for deploying and marketing the new networks across Europe. This has put pressure on the financial health of the European Telecommunication providers and has resulted in a delay of 3G network implementations.<sup>26</sup>

Here is a brief sampling of announcements concerning 3G delays:



<sup>&</sup>lt;sup>25</sup> Howard Rheingold.. Excerpt from 'Smart Mobs—The Next Social Revolution," published October 15, 2002. http://www.smartmobs.com/book/toc\_7.html.

<sup>&</sup>lt;sup>26</sup> Paul Budde. Paul Budde Communications Pty Ltd., "Europe—Third Generation (3G) Mobile." May 5, 2003. http://www.budde.com.au/.

- MmO2, which operates under the O2 brand, has pushed back until the second half of 2004 its British launch of 3G, which offers services such as faster Internet access, video messaging, and games.<sup>27</sup>
- Poland has extended the 3G launch to 2005.<sup>28</sup>
- Three European cell phone providers announced Monday, April 7, 2003, that they are jointly developing wireless services. The deal unites Telefónica Móviles in Spain, T-Mobile International in Germany, and Telecom Italia Mobile (TIM) in Italy. This agreement is further evidence that European cell phone operators are bending under huge debt loads and a souring economy. The main focus of this joint development is to attract corporate clients because they travel frequently and are early adopters of new wireless Web offerings.<sup>29</sup>

Taylor Nelson Sofres (TNS) surveyed demand for 3G services and released its results in February 2003:<sup>30</sup>

- 42 percent are interested in 3G services.
- Eastern Europeans are more interested than Western Europeans.
- 21 percent of everyone surveyed was wiling to pay an additional £6–£10 per month for some services such as MMS, high-speed Internet, and e-mail.

These survey results show that the market is still ready to embrace the new services associated with 3G despite the frequent delays.



<sup>&</sup>lt;sup>27</sup> Australian IT Web site, "3G Prompts \$25.5bn mmO2 Loss." May 22, 2003. http://australianit.news.com.au/articles/0,7204,6474301%5e15322%5e%5enbv%5e15306,00.html

<sup>&</sup>lt;sup>28</sup> 3G Newsroom, "Polish Gov to Consider Rollout Delay Request." March 21, 2003. http://www.3gnewsroom.com/3g\_news/mar\_03/news\_3213.shtml.

<sup>&</sup>lt;sup>29</sup> Ben Charny.. CNET News.com, "European Wireless Carriers Unite." April 7, 2003. http://news.com.com/2100-1039-995826.html.

<sup>&</sup>lt;sup>30</sup> Taylor Nelson Sofres Web site—press release, "Signs That European Users Are Willing to Pay a Premium for 3G Handsets and Services—Survey Findings." February 10, 2003. http://www.tns-global.com/corporate/Doc/0/15KP1OG0TRAKTBLM1N5KEV4N19/643.htm.

#### **Mobile Application Environments**

#### Mobile OS

#### Symbian, Palm OS, Microsoft CE, and Linux

Traditionally, mobile phones have not required a PC-like operating system (OS), as most devices use a specialized OS embedded in the hardware of the device. With the convergence of PDAs and mobile phones, the three largest providers of PDA OSs are seeking to expand their market share of next-generation smartphones. There are four competing PDA/smartphone OS's:

- Symbian, a British software developer, provides an operating system for mobile phones and handheld computers and is owned by several mobile phone makers and Psion PLC.
- Palm, which traditionally has licensed its OS for PDA devices, has recently acquired Handspring, the maker of the Treo integrated PDA/cell phone, positioning its OS in the emerging smartphone market.
- Microsoft, in a clear move to expand its dominance of the PC operating system, is heavily marketing its next-generation mobile OS platform. On June 23, 2003, Microsoft unveiled the latest version of its handheld OS, as well as a new brand name for its software for mobile devices. The new Windows Mobile 2003 software for Pocket PC features built-in support for Wi-Fi and Bluetooth, improved e-mail synchronization, a new imaging application, and better video playback. <sup>31</sup>
- An emerging OS for cell phones is Linux. As the open source OS has gained steam in the enterprise computing market, it is also beginning to emerge as an alternative OS for mobile phones. Motorola later this year will start selling phones based on the Linux OS.<sup>32</sup>

<sup>&</sup>lt;sup>32</sup> Carmen Nobel. eWeek, "Motorola Moving Cell Phones to Linux". February 13, 2003. http://www.eweek.com/article2/0,4149,887385,00.asp.



<sup>&</sup>lt;sup>31</sup> All Net Devices—*Wi-Fi Planet* article, "Pocket PC Makers Launch New Windows Mobile-Based Devices." <u>http://www.wi-fiplanet.com/news/article.php/2227221</u>.

IDC estimates that phones running the Symbian OS from Nokia and Sony Ericsson dominate the market, with a 67 percent share, and that Palm- and Microsoft-based phones account for about 13 percent each.<sup>33</sup>

#### **Development Environments**

#### Java, BREW

There are two competing development environments used to create software applications for wireless devices. The most popular language is Java (the current version is Java 2 Micro Edition or J2ME) created by Sun Microsystems. The J2ME specification competes with Qualcomm's binary runtime environment for wireless (BREW) technology.

The J2ME and BREW platforms are used by software developers to make games, ring tones, and other data that are downloadable to cell phones. Some industry observers see Java technology as widening its lead over BREW. One estimate said 13 million Java-enabled phones would be sold in the United States this year, compared with 10 million BREW-enabled phones. In 2004 twenty-seven million Java-enabled phones are expected to be sold in the United States, compared with 15 million BREW-enabled devices.<sup>34</sup>

#### Wireless Access Protocol

Wireless access protocol (WAP) is a general term used to describe the multilayered protocol and related technologies that bring Internet content to mobile devices such as PDAs and cell phones. WAP uses microbrowsers, browsers with small file sizes that can accommodate the low memory constraints of handheld devices and the low-bandwidth constraints of a wireless-handheld

<sup>&</sup>lt;sup>34</sup> Ben Charny. CNET News.com, "More Brewing for Qualcomm?" February 26, 2003. http://news.com.com/2100-1039-986162.html.



<sup>&</sup>lt;sup>33</sup> Arik Hesseldahl. Forbes Magazine Online, "Microsoft's Wireless Aspirations Get a Boost." September 15, 2003. http://www.forbes.com/2003/09/15/cx\_ah\_0915motmsft.html.

network. Applications are written using a specific WAP language, wireless markup language (WML) which enables the application to be seen on small screens such as those of cell phones.<sup>35</sup> When introduced in the late 1990s WAP was sold to consumers as the "Web on your cell phone." However, the user experience of a WAP application—mostly text, menus, and limited input—is vastly different from a user's typical Web experience; hence, WAP never met user expectations.<sup>36</sup> There is substantial industry debate on the future of WAP as a development platform. Some critics believe that WAP will no longer be needed with the deployment of 3G mobile services; others take the opposite view and believe that WAP will actually grow in importance with the emergence of next-generation networks. In a travel context many reservation applications have been created using WAP and, to this date, have a low level of adoption.

#### Messaging

#### Short Messaging Service (SMS)

SMS is text-based messaging used extensively on mobile phones, particularly in Europe and Asia. SMS is beginning to catch on in the United States where users are mostly younger mobile phone owners. Millions of SMS messages are being sent by users worldwide, with traffic particularly heavy on holidays such as New Year's Eve. Travel suppliers and intermediaries have used SMS for some time. Many online agencies and suppliers use SMS to provide customers with updates on flight arrival and departure information.



<sup>&</sup>lt;sup>35</sup> Internet.com—Webopedia—Definition of WAP. <u>http://www.webopedia.com/TERM/W/WAP.html</u>.

<sup>&</sup>lt;sup>35</sup> Mobile and Wireless Solutions, "Is WAP Dead?" December 2002. <u>http://www.mobile-and-wireless.com/Articles/Index.cfm?ArticleID=27117</u>

<sup>&</sup>lt;sup>36</sup> Mobile and Wireless Solutions, "Is WAP Dead?" December 2002. <u>http://www.mobile-and-wireless.com/Articles/Index.cfm?ArticleID=27117</u>.

#### Enhanced Messaging Service (EMS)

EMS is an adaptation of SMS that allows users to send and receive ring tones and operator logos on EMS-compliant handsets. EMS can integrate text, melodies, pictures, sounds, and animations to enhance messages.<sup>37</sup>

#### Multimedia Message Service (MMS)

MMS is often called photo or picture messaging because its operation is similar to the way in which a text message is sent, but it allows the user to send a multimedia message such as a photo or picture along with the text. With compatible MMS mobile handsets, mobile phone users can take pictures and then instantly send the photos to people, anywhere in the world, who have Internet access or an MMS mobile phone themselves. Mobile phones with MMS allow users to do the following:

- Take digital photographs.
- Send and receive full-color pictures and short video messages.
- Add a text message to a picture.

MMS services are just coming on the market and are part of the move to more advanced mobile networks. Mobile phone carriers see MMS as the key application that will finally allow data to overtake voice, raise their revenues, and reverse their declining margins.<sup>38</sup>

SMS use is increasing around the world and so is MMS, as the services become available, according to a poll of 10 million subscribers in more than 200 countries, conducted by SMS.ac, Inc. Of the more than 40,000 respondents, 86.6 percent said they use texting at least once per day. In another poll, 84.2 percent said they use text more than voice. The survey also showed

<sup>37</sup> SEARCHNETWORKING.COM—Glossary Definition.

<sup>38</sup> Enabling the Wireless Enterprise, "Nokia Battles Microsoft over Phone OS." November 19, 2002. http://www.fawcette.com/wireless/nokia\_Fawcette\_11\_19\_02/default\_pf.asp.



http://searchnetworking.techtarget.com/sDefinition/0,,sid7\_gci785459,00.html.

that with the increasing use of MMS, 33.1 percent were able to send and receive pictures on their phones, indicating that there is still unrealized demand for this new technology.<sup>39</sup>

#### Instant Messaging

In the United States anyone with a teenaged son or daughter understands the impact of instant messaging (IM) from providers such as AOL, MSN, or Yahoo. Parents are quick to observe that their teenagers spend more time chatting online with their friends than talking on the traditional telephone. This revolution is generational, and as this generation matures, IM will be an important part of its business life as well. In fact, the forecast is that personal use as well as enterprise IM implementations will grow significantly over the next five years.<sup>40</sup>

#### IM and Mobile Phones

Mobile phone carriers are sensitive to the growth of IM. New technology is being introduced that allows mobile users to have two-way conversations with PC users using IM. For example, in May 2003, Cingular Wireless announced that users of Yahoo! Messenger can now send instant messages to Cingular mobile customers via text messaging. In September, Cingular announced a similar plan with AOL Instant Messenger users.<sup>41</sup> In early July America Online and Verizon Wireless announced a partnership to launch a new Mobile IM service using Verizon 'Wireless's TXT messaging service. The service allows AOL members and registered users of the AOL Instant Messenger service to send instant messages directly from their desktop computers to Verizon Wireless customers by typing the phone number of the person they want to reach. In turn, Verizon Wireless subscribers can respond to incoming messages from their phones even if they do not have an AOL Instant Messaging (AIM) account.<sup>42</sup>

<sup>&</sup>lt;sup>42</sup> CDMA Development Group CDG.Org news release. September 25, 2002. http://www.cdg.org/news/search/2002/09/industry/092502\_ind\_b.html.



<sup>&</sup>lt;sup>39</sup> SMS.ac press release, "SMS.ac Global Polls Indicate More Uses and Usage for Mobile Communications." June 11, 2003. http://www.sms.ac/corporate/pr\_061103.asp.

<sup>&</sup>lt;sup>40</sup> *InformationWeek,* "Instant Messaging Gets Down To Business." March 3, 2003. http://www.informationweek.com/story/IWK20030228S0024.

<sup>&</sup>lt;sup>41</sup> *CITA Daily News,* "AOL, Cingular Sign IM Agreement." September 22, 2003.

An important characteristic of IM is the ability to select specific contacts ("buddys") and to be notified when they are available for messaging. This ability to know whether a friend or business associate is online represents an important difference between IM and SMS-style messaging.

#### **Emerging Applications**

At the CTIA Wireless 2003 show in March, attendees were able to view the ways in which cell phones are morphing into portable entertainment devices. For example, Nokia introduced a phone with built-in MP3 and FM radio capabilities. It also launched N-Gage, a cell phone and game console. Motorola is working with MTV to put music television–themed games, ring tones, and images on Motorola phones. The phone makers and wireless carriers are attempting to generate new sources of revenue with their entertainment services. Motorola said all its new phones will have color screens in anticipation of the new entertainment services.<sup>43</sup>

#### Camera Phones

Camera phones are becoming very popular. Here is some recent research that forecasts their growth:

- According to research firm Future Image Inc., camera phones will outsell digital and film cameras combined in 2003. The challenges to mass-market adoption of camera phones in the United States—both business and technical—will be met in the next 12 months, with carriers such as Sprint, T-Mobile, and AT&T Wireless already paving the way with months of television and print ads aimed at raising public awareness of picture messaging, according to the Future Image research. <sup>44</sup>
- A recent A.T. Kearney/Cambridge Mobinet study found that two-thirds of mobile phone users are willing to pay to send photo messages, and 42 percent of customers under age 19 will

<sup>&</sup>lt;sup>44</sup> Future Image, Inc. Web site, "The Future Image Report, V.10 I.9, Apr. 2003." April 2003. http://www.futureimage.com/sfm.cgi?sn=0NT968|t=p/FIRV10I9.



<sup>&</sup>lt;sup>43</sup> Ben Charny. CNET News.com, "CTIA—Gear and Clothing in New Orleans." March 19, 2003. <u>http://news.com.com/2100-1039-993343.html</u>.

pay more than \$1 per message. The study, conducted by A.T. Kearney and the Judge Institute of Management at Cambridge University, included 5,600 users in 15 countries. <sup>45</sup>

According to Gartner Research, 66 percent of mobile phones sold in Western Europe will have embedded cameras by 2006. Table 7 shows the projected growth of camera phones in Western Europe.<sup>46</sup>

Table 7

	2002	2003	2004	2005	2006
Embedded camera phones	1.7%	9%	21%	45%	66%
Camera accessories	0.8%	5.0%	3.0%	2.0%	1.5%
Total mobile camera- capable terminal sales to end users (Thousand number of units)	2,626	14,770	24,657	48,159	70,036

The significance of camera phones to the travel industry is obvious. Given these predictions it is easy to imagine a near future in where travelers routinely e-mail pictures from their camera phones while traveling as a common means of sharing the experience with friends and relatives.

#### Gaming

At this year's 3G conference in Cannes, France, cell gaming was also a hot trend demonstrated by most vendors. Europeans are turning to their mobile phones to play the lottery, place bets, enter sweepstakes, and participate in other types of gambling. The m-gambling market, based largely on the success of text messaging, is worth an estimated \$50 million and is expected to expand further. Tech companies are signing on for a piece of this market: Hewlett-Packard provides hardware and systems to Openlot, a mobile lottery software developer in Amsterdam.

<sup>&</sup>lt;sup>46</sup> Gartner Research press release, "Gartner Says 66 Percent of Mobile Phones Sold in Western Europe Will Have Embedded Camera by 2006."



<sup>&</sup>lt;sup>45</sup> University of Cambridge press release, "Consumers See Photo Messaging as First 'Breakout' Capability of Advanced Wireless, According to Latest A.T. Kearney/Cambridge Mobinet Study." July 3, 2003.

http://www.jims.cam.ac.uk/perl/search/search.pl?\_STATUS=GO\_TO\_FRAMESET&FILE=/news/p ress\_releases/2003/03\_06\_03.html.

Siemens provides financial and marketing support to a German m-gambling software start-up, Scaraboo. Orange UK gives U.K. betting companies access to its customer network. However, some wireless carriers, worried that customers might rack up huge debts on their regular phone bills, are experimenting with prepaid cards. Currently, there are no laws in Europe preventing mobile gambling. Interactive betting is illegal in the United States.<sup>47</sup> The growth of mobile gaming has significance for the Casino sector of the global travel industry.

In the United States the primary type of gaming is more traditional video games played on mobile phones. The video game mobile phone industry is expected to generate \$7 billion in revenue for U.S. cell phone carriers by 2007.<sup>48</sup>

#### Ringtones

Ringtone sales have been a billion-dollar industry in Europe and Asia and are now proving popular in the United States. IDC expects ring tone sales to hit over \$400 million in 2005, up from \$16.6 million in 2002. For a few dollars users can download the latest hits from their carriers' own Web sites, as well as third-party sellers such as Microsoft's' MSN Service or America Online's mobile-download center. The songs are downloaded from the sites and sent wirelessly to the user's mobile phone, with charges billed to a credit card or mobile phone bill.<sup>49</sup> The success of Ringtones demonstrates how providing personalized services to consumers can generate significant revenue.

#### Push to Talk

The walkie-talkie push-to-talk feature has been so popular that it alone has allowed Nextel to survive and prosper in the tough U.S. telecommunications industry. Nextel's DirectConnect went

<sup>&</sup>lt;sup>49</sup> Wireless Week, "Ringtones, Entertainment Apps Make Headway." June 12, 2003. http://www.wirelessweek.com/index.asp?layout=document&doc\_id=121055&verticalID=34&vertic al=Business+and+Finance&industry=.



<sup>&</sup>lt;sup>47</sup> Casino Online Gambling Web site, "Europe Bets on Mobile Gambling." April 11, 2003. http://www.casino-online-gambling-sites.com/m-gambling\_in\_europe.html.

<sup>&</sup>lt;sup>48</sup> Ben Charny. CNET News.com, "Game Makers Face Own 'Survival Game." March 7, 2003. http://news.com.com/2100-1039-991564.html.

nationwide this past August and is drawing push-to-talk competition from most of the major carriers set to be released this fall and next winter.

#### Video Phones

The dream of a video phone has long been part of the global telephone user psyche. The introduction of new smartphones and 3G networks is bringing this vision of streaming video conversations into reality. Video phones that support live video calls are being slowing rolled out globally in conjunction with new 3G services. Additionally, these mobile phones will have the capability to provide the user with other 3G technologies, such as allowing users to watch sporting events and download film clips.<sup>50</sup>

#### Location-Based Services (LBS)

The most intriguing applications emerging in the wireless world are location-based services (LBS). LBS can be described as "applications that react according to a geographic trigger." A



geographic trigger might be the input of a town name, Zip code, or street into a Web page; the position of a mobile phone user; or the precise position of a person's car as he or she is driving home from the office. Using the knowledge of where someone is or where they intend to go is the essence of LBS.<sup>51</sup>

LBS is not a new concept, but the emergence of broadband mobile networks has brought new life to the subject. There is a huge amount of information

<sup>&</sup>lt;sup>51</sup> WhereOnEarth.com, "Essential Components." http://www.whereonearth.com/lbs/01\_02.htm.



<sup>&</sup>lt;sup>50</sup> The Scotsman.com, "The Next Big Thing for Mobiles." April 15, 2003. http://www.news.scotsman.com/index.cfm?id=437762003.

available that can be repurposed for the wireless Internet. Even more important is the emergence of new applications that take existing Internet information and filter it to personalize content based on a user's physical location and opt-in preferences. This new application of LBS can provide compelling added-value services to leisure and business travelers.

There are a number of key components of LBS that need to be deployed to provide the right service to the right traveler for the right situation. First, it is essential to locate the individual through some type of positioning technology.

#### **Global Positioning System**

A common way to track physical location is through the Global Positioning System (GPS), a worldwide radio-navigation system formed from a constellation of 24 satellites and their ground stations. GPS uses these satellites as reference points to calculate positions accurate to a matter of meters.<sup>52</sup>

#### **Cellular Triangulation**

Triangulation is a process by which the location of a radio transmitter can be determined by measuring either the radial distance or the direction of the received signal from two or three different points.<sup>53</sup>Triangulation can be used in cellular communications to pinpoint the geographic position of a user and is less costly than GPS, but not as accurate.

#### **Opt-in Services**

The term "opt-in" refers to messages and services that have been requested by the individual receiving them. Unlike spam e-mails that are sent out to large lists of recipients without regard to whether or not they want the information, opt-in e-mails are sent only to people who specifically request them. In a similar way, services can be created on an opt-in basis to allow the user to receive content based on predefined preferences.

 <sup>&</sup>lt;sup>52</sup> Trimble Navigation LTD Web site, "What Is GPS?" *http://www.trimble.com/gps/what.html.* <sup>53</sup> SEARCHNETWORKING.COM—Glossary Definition. http://searchnetworking.techtarget.com/sDefinition/0,,sid7\_gci753924,00.html.



#### **Sentient Things**

In his book, *Smart Mobs*, author Howard Rheingold describes the emergence of sentient things: "Information and communication technologies are invading the physical world, a trend that hasn't even begun to climb the hockey stick growth curve. Shards of sentient silicon will be inside boxtops and dashboards, pens, street corners, bus stops, money, most things that are manufactured or built, within the next ten years. These technologies are "sentient" not because embedded chips can reason, but because they can sense, receive, store, and transmit information. Some of these cheap chips sense where they are: the cost of a global positioning system chip capable of tracking its location via satellite to accuracy of ten to fifteen meters is around \$15 and dropping."<sup>64</sup>

It is conceivable that in the not-too-distant future objects people encounter when they are traveling may have their own ability to transmit information. Imagine approaching an intersection in a strange city and being beamed information about the buildings and surrounding area. Smart cities are clearly on the horizon and will affect the way people interact with places on their travels.

#### Bar Codes

The most common sentient device in use today is the bar code that appears on most retail items. Most consumers are accustomed to the supermarket ritual whereby the checker runs the bar code across the scanner to miraculously arrive at your total. The bar code is actually the first example of a trend toward sentient things appearing in our environment.

Marc A. Smith, noted sociologist at the Microsoft Researcher and Development Labs, has created a project called advanced user resource annotation (AURA), which reads bar codes with a wireless handheld device. "We use the Toshiba e740 and a Compact Flash bar-code reader, run AURA software, and can walk up to any bar-coded object, any ISBN-coded object, scan it, and the device brings back information about that object.... In Hong Kong, during the height of the SARS outbreak, there was a system that could tell you which buildings had had confirmed SARS

<sup>&</sup>lt;sup>54</sup> Howard Rheingold. "Smart Mobs—The Next Social Revolution." http://www.smartmobs.com/book/toc\_4.html.



cases.<sup>"55</sup> The use of bar codes and wireless devices in a way similar to the AURA project method could allow a traveler to receive information from buildings, signs, or any object that provides location-based information.

Radio Frequency Identity

Bar code technology has been around for many years, whereas radio frequency identity (RFID) chip technology is a new phenomenon that is growing rapidly. RFID tags are miniscule microchips that already have shrunk to half the size of a grain of sand. They listen for a radio query and respond by transmitting their unique ID code. Most RFID tags have no batteries: they use the power from the initial radio signal to transmit their response.<sup>56</sup>

Retailers and manufacturers in the United States and Europe, including Wal-Mart stores, have begun testing RFID systems, which use millions of special sensors to automatically detect the movement of merchandise in stores and to monitor inventory in warehouses.<sup>57</sup> As these devices proliferate, we may quickly be immersed in an environment that can communicate essential information to travelers via their mobile technology.

#### Wi-Fi

#### 802.11b, 802.11a, 802.11g

"Far from what tradition might indicate, the wireless Internet isn't turning out to be one of those tech breakthroughs that arrives accompanied by a Microsoft-sized marketing campaign and eightfoot high display in consumer-electronics stores. Instead, it's a grassroots trend that moved from

<sup>&</sup>lt;sup>57</sup> Alorie Gilbert. CNET News.com, "Lawmakers to Probe RFID Technology." August 11, 2003. http://news.com.com/2100-1039-5062009.html.



<sup>&</sup>lt;sup>55</sup> Paul Festa. CNET News.com, "Microsoft's In-House Sociologist." August 19, 2003. http://news.com.com/2008-1082-5065298.html.

<sup>&</sup>lt;sup>56</sup> Declan McCullagh. CNET News.com, "RFID Tags: Big Brother in Small Packages." January 13, 2003. http://news.com.com/2010-1069\_3-980325.html?tag=rn.
research labs, to techie circles, to hobbyists-and that now, after five years is about to reach the

general public."58

Table 8

Wi-Fi Standards		
802.11b	802.11a	802.11g
The first and most widely used Wi-Fi standard. Information is delivered at speeds up to <b>11 Mbps</b> in the <b>2.4 GHz</b> band at a range of about 300 feet.	An alternate standard first introduced in late 2001. It works in the <b>5 to 6 GHz</b> band with speeds of up to <b>54 Mbps</b> . Not compatible with wither 802.11b or 802.11 g.	On June 12, 2003, the Standards Board Review Committee of the Institute of Electrical and Electronics Engineers (IEEE) approved the 802.11g specification as a standard. The new standard is interoperable with the 80211.b and has transmission rates up to five times faster than b in the same <b>2.4GHz</b> band.

This quote from a recent *Business Week* article describes the dramatic growth of a broadband wireless technology known as 802.11x, or more commonly known as Wi-Fi. Wi-Fi, which stands for wireless fidelity, is a networking standard that's used to create WLANs in homes, offices, hotels, and airports at speeds up to 11 megabits per second. This is far faster than the peak 144-kilobit-per-second rate that the new 3G mobile phone networks plan to deliver Wi-Fi is both fast and relatively inexpensive to install. To connect to a Wi-Fi network, a laptop or PDA needs a special network card. WLANs are a form of disruptive technology that promises to have the same impact on the networking industry that wireless phones did on the telecommunications industry. Wi-Fi is already having a disruptive influence on the global travel industry.

## Hotspot Growth

A recent Wall Street Journal article tracked the growth of Wi-Fi hotspots worldwide: 59

<sup>59</sup> Nick Wingfield. *The Wall Street Journal,* "Anytime, Anywhere." March 31, 2003.



<sup>&</sup>lt;sup>58</sup> *Business Week Online,* "Wi-Fi: It's Fast, It's Here—and It Works." April 1, 2002. www.businessweek.com/technology/content /apr2002/tc2002041\_1823.htm.

- There are 28,680 hotspots in North America.
- These hotspots will serve 4.7 million users.
- Hotspots in Asia will double to 26,400.
- In Europe the number of hotspots will surge to 15,700.
- Global demand will grow to 30.5 million users by the end of 2004.

And it's happening in the travel industry:

- At airports—at club rooms for AA and UA and at gates at prominent airports such as San Francisco, Salt Lake City, Pittsburg, and San Jose.
- At hotels—free Wi-Fi at Omni Hotels and hotspots at Marriot, Fairmont and Starwood Hotels as well as thousands of individual properties worldwide have or are in the process of installing Wi-Fi networks.
- On flights—Lufthansa tested Wi-Fi on flights from Washington to Frankfurt and expects to sell
  Wi-Fi aboard 80 long-haul planes by mid-2004.
- In Asia and Australia—Telstra has joined with four major telcos on a Wi-Fi project to form an Asian wireless broadband alliance aimed at business travelers. The alliance aims to serve business travelers who need to stay connected to the Internet while they are away from the office or home via hotspot connections based at international airports, business hubs, hotels<sup>60</sup>

As Wi-Fi hotspots continue to grow at hotels and airports and new Wi-Fi-enabled devices such as laptops, PDAs, and smartphones proliferate, it will be commonplace to find frequent travelers connected throughout their trips. Implications of this broadband always-on technology are significant.

<sup>&</sup>lt;sup>60</sup> Mark Berniker, Wi-Fi Planet "Telstra Joins Asian Wi-Fi Broadband Alliance" March 21, 2003 http://www.wi-fiplanet.com/news/article.php/2168561



### Major Wi-Fi Players

With Wi-Fi providing a low-cost method to launch WLANs, a number of companies have emerged as leaders in creating Wi-Fi hotspots on a national or even international basis. Here are some of the more prominent companies involved with the Wi-Fi explosion.

### Wayport

Wayport is the leading provider of high-speed Internet access for the travel industry. Wayport has installed Wi-Fi networks at more than 565 hotels and 12 airports nationwide and at approximately 75 McDonald's locations in the San Francisco Bay Area. Wayport recently announced roaming agreements with major telecommunications companies including SBC, Verizon, Sprint, and MCI. These roaming agreements mark a significant development. First, they simplify the billing process for both individual and corporate use, allowing Wi-Fi access without the need of a separate agreement. Second, they foretell the emerging use of integrated mobile phones that have Wi-Fi capabilities.

#### StayOnline

StayOnline provides hoteliers with cost-effective wireless Internet access solutions for guest and hotel use. The company's SuiteOnline product brings wireless technology within the reach of even the smallest hotel property by combining in-room computing solutions with software-free connectivity for laptops on a robust wireless network.

#### T-Mobile

A traditional telecommunication company that has been very active in installing Wi-Fi hotspots is T-Mobile. U.S operations of Bellevue, Washington–based T-Mobile consist of T-Mobile USA Inc. (formerly VoiceStream Wireless) and Powertel Inc. T-Mobile International AG & Co. K.G. is the mobile communications subsidiary of Deutsche Telekom. T-Mobile hotspots can be found nationwide at airports, airport clubs, Starbucks coffeehouses, and Borders Books and Music Stores and are expanding globally.



### Boingo

Sky Dayton, the founder of Earthlink Networks, created Boingo in late 2001. Boingo does not actually operate Wi-Fi locations, but instead provides network access through partnerships with Wayport, Pronto, and nine other Wi-Fi hotspot providers. Boingo essentially operates as a Wi-Fi Internet service provider (ISP), allowing access to other network operators through a single account and billing system. Given the recent aggressive stance of Boingo's largest partner, Wayport, the ultimate success of Boingo at travel locations such as airports and hotels is in question.

### Cometa

Recognizing the opportunity of Wi-Fi, leading technology companies AT&T, Intel, and IBM and global investment concerns Apax Partners and 3i created Cometa in December 2002. Cometa Networks plans to provide Wi-Fi service to telecommunications companies, ISPs, cable operators, and wireless carriers, who then can offer their customers wireless Internet access using Wi-Fi technology. Cometa will also offer wireless Internet access to enterprise customers through participating carriers. The company has targeted national and regional retail chains, hotels, universities, and real estate firms to deploy the broadband wireless access service in hotspots throughout the top 50 U.S. metropolitan areas.

#### Free Hotspots

In addition, to these commercial Wi-Fi initiatives, there are a number of free hotspots springing up across the globe. Wi Fi Free Spot (http://www.wififreespot.com/) is one of many URLs that list free hotspots worldwide.

## Free Vs. Subscription Services

There is an ongoing industry debate over whether Wi-Fi will thrive as a subscription service or whether free hotspots will allow people to connect without a charge in open spaces in cities throughout the world. The issue of whether a hotel looks at Wi-Fi as a revenue-generating amenity or as a necessary service is also being debated by industry pundits. The long-term



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economics of Wi-Fi hotspots are questionable. The success of Wi-Fi in the travel and hospitality industry will not be based on the fee charged to the traveler, but rather its success will lie in the services offered to travelers that enhance their experience.

### Security

One common criticism of Wi-Fi networks concerns security. To address that issue the Wi-Fi Alliance, a nonprofit organization formed in 1999 to certify interoperability of 802.11 products, has created a standards and certification process for WI-Fi security products. Wi-Fi security standards, known as Wi-Fi protected access, are becoming the primary standard for security for all Wi-Fi networks. The goal is to create standards-based interoperable security available for all Wi-Fi networks.

## Bluetooth

Bluetooth is wireless technology that enables data exchanges between devices in about a 30-foot range of each other. In recent years Bluetooth has found its niche as a cable cutter, and technologists are integrating it into a variety of devices such as printers, camcorders, handheld computers, and wireless phones. IDC analysts predict that by 2006 nearly 80 percent of new wireless phones and 70 percent of handled computers will be Bluetooth-enabled, up from 2.7 percent and 1.1 percent in 2002, respectively.<sup>61</sup> One way to use Bluetooth technology is as a wireless personal LAN. Frequent travelers could connect their mobile phones, PDAs, and laptops together to allow communication across devices using Bluetooth technology.

## Which Network Will Win?

#### The Great Debate

The future of wireless networking is a hotly debated subject. Traditional Telecom types tend to dismiss WLANs such as Wi-Fi as interim steps that will be obsolete as 3G and 4G networks

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<sup>&</sup>lt;sup>61</sup> Alex Slawsby. IDC Research, "Worldwide Bluetooth-Enabled Mobile Device Forecast, 2002–2007." June 2003.

become commonplace. Telecom critics point to the high costs of 3G licenses, repeated delays, and the spiraling costs of implementing these next-generation networks.

New technology may also play a role. For example, Flarion Technologies, a New Jersey start-up, is pioneering new low-cost, LAN-like wireless connectivity for wide area networks. The core technology that Flarion uses today, which is based on the flash orthogonal frequency divisional multiplexing standard, was spun off by Bell Labs. Flarion was formed in February 2000 with investment from Lucent and Cisco, among others, to exploit this technology.<sup>62</sup>

### WAN and LAN: A Great Combo

It has become clear to many that the most logical near-term outcome of this debate is a combination of wide area and local area wireless networks. Next-generation smartphones will be Wi-Fi enabled, and with roaming agreements from companies such as Wayport, traditional customers of Verizon or Sprint will be able to access Wi-Fi hot spots through their smartphones. Motorola, Nokia, and Ericsson are working on Wi-Fi phones that will allow people to move from Wi-Fi to cellular networks without even noticing. These new phones should be ready in 12 months.<sup>63</sup> If the traveler is roaming in an area without a hotspot, the device will default to the slower 2.5 or 3G wireless network. This combination gives subscribers good data access everywhere and lowers the cost of wide area network deployment in heavy traffic locations where hotspots are becoming prevalent.

## Devices

## Smartphones

So what exactly is a smartphone? Features can vary as there is no common industry wide definition. Most agree that "smartphone" refers to mobile phones that integrate PDA functionality.

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<sup>&</sup>lt;sup>62</sup> Flarion Technologies news release, "Flarion's Mobile Broadband Alternative." April 2003. http://www.flarion.com/newsroom/about\_0304a\_03.html.

<sup>&</sup>lt;sup>63</sup> Heather Green and Steve Rosenbush. *Business Week,* "Wi-Fi Means Business." April 28, 2003.

Most new smartphones include next-generation capabilities, such as the ability to run Java applications and polyphonic ring tones as well as the ability to read MMS messages. Many smartphones include color displays and built-in cameras. Often smartphones contain PDA operating systems such as Palm or Microsoft's Windows Mobile 2003. The convergence of PDA functionality into the mobile phone presents a challenge to balance form and functionality. In Japan, small screens have been easily accepted. In the United States, where big cars, big televisions, and big homes are preferred, the small size of a mobile phone screen may be an obstacle to adoption.

Some smartphones such as the Trio from Handspring, now a part of Palm, clearly show their roots.



New designs have emerged, such as the Danger Hiptop (sold by T-mobile under the name Sidekick), which is more reminiscent of two-way pagers.

Danger Hiptop



Most major mobile phone manufacturers have their versions of smartphones coming to the market in the next 12 months. Within 2 to 3 years smartphones will be commonplace. Given the connection between the frequent traveler and adoption of next-generation devices, the emergence of smartphones as a platform for communication with

travelers will soon become an important opportunity for all parts of the travel industry value chain.

## PDAs

In 1987 I attended MacWorld and witnessed a historic event in the world of handheld computing. John Sculley, at that time CEO of Apple, introduced a video titled "Knowledge Navigator" showing



his vision of personal computing in the 21st century. In the spring of 1992 Apple introduced the Newton, and John Scully coined the phrase "personal digital assistant" (PDA). The Newton had many problems with software, handwriting recognition and, most of all, price. By 1998 Apple stopped all production of the Newton. It is a great example of the right idea, in the wrong device, at the wrong time. It was followed by equally unsuccessful efforts by Motorola and Sony with PDAs called Envoy and Magic Link, which used the General Magic Cap operating system.<sup>64</sup>

#### Palm

Despite these failures success was on the horizon. In 1994 Palm began developing the Palm Pilot organizer, which was introduced two years later. The Palm Pilot had many features that resembled the failed Apple Newton, including its own handwriting recognition application called Graffiti. Instead of following Apple's lead in producing an overly enhanced, feature-rich Newton, Palm decided to concentrate on making a speedy and efficient machine that did the basic tasks such as note taking, contact, and time and task management. This time the price, device form, and functionality were on target and Palm quickly grew. Palm sold over one million units during its first year, bettering Sony's Walkman, which took one and half years to reach worldwide sales of one million.<sup>65</sup>

#### Pocket PC

The success of Microsoft is not always in innovation, but in recognizing emerging applications and devices and creating competitive products. The growth of the Microsoft Pocket PC is an example of this strategy. The original vision for what became the Microsoft Mobile Device division was not the handheld PC, nor the pocket PC, but a device Microsoft called the "wallet PC." Microsoft president Bill Gates described it in a 1996 interview: "A wallet PC will be a pocket-size computer with a snapshot-size color screen that you will use in place of many essentials you carry around with you today—money, keys, identification, credit cards, tickets—as well as items

<sup>&</sup>lt;sup>65</sup> Daniel Leong. March 9, 2001, article on PDA Wear.com. "History of PDA – The Beginning http://www.pdawear.com/news/article\_pda\_beginning.htm.



<sup>&</sup>lt;sup>64</sup> The History of Palm. <u>http://jyotishsoft.hypermart.net/pdahist.htm</u>.

that provide you with mobile information and communications, such as a watch, newspapers or other reading material, address and appointment books, photographs, calculator, portable telephone and pager.<sup>66</sup> Though Microsoft has not realized this vision of a wallet PC, the Microsoft Pocket PC has become a major force in the mobile marketplace.

According to Gartner, in the first quarter of 2003, Palm maintained its position as the top PDA manufacturer, with 38.2 percent of the market, but Palm was the only top-tier vendor to post negative growth. Sony moved up one spot to the No. 2 position (Sony licenses the Palm OS) with a 16.6 percent market share. HP fell to No. 3 with 13.5 percent of the market. But from an OS perspective, the numbers tell a different story: Palm OS PDA shipments represented 49 percent of the worldwide market, despite a shipment decline of nearly 400,000 units from one year earlier. The Windows CE market share totaled 36 percent in the quarter, as shipments increased by more than 330,000 from one year ago. On an end-user revenue basis, Windows CE PDAs accounted for 52 percent of the market in the first quarter of 2003, while Palm OS licensees had 37 percent of the market, marking the first time Windows CE PDA revenue has surpassed Palm OS.<sup>67</sup> Clearly, these numbers reflect the growing acceptance of Windows CE PDAs.

#### Psion

Psion was the first handheld organizer created all the way back in 1984. The Psion remained a simple database organizer for many years until September 1991 when the small clamshell Series 3 was launched. The company continued to grow throughout the 1990s and rode the tech boom of the late 1990s early 2000. But soon after that the collapse of the dot-com era and fierce competition from U.S. rival Palm caused shares to fall about 95 percent. Psion issued a profit warning in October 2000, saying that earnings for 2001 would be "well below" expectations. In July 2001 Psion announced that it was stopping production of its flagship handheld computers.

http://www4.gartner.com/5\_about/press\_releases/pr29apr2003a.jsp.



<sup>&</sup>lt;sup>66</sup> HPC Factor. Original interview from *The Huntsville Times*, February 1996, "A Look Back to the Beginnings of the Microsoft PDA Project." http://www.hpcfactor.com/reviews/walletpc/default.asp.

<sup>&</sup>lt;sup>67</sup> Gartner press release, "Gartner Says Worldwide PDA Shipments Declined 11 Percent in the First Quarter of 2003." April 29, 2003.

Psion chose to concentrate on the Symbian consortium's mobile phone software operations, and its own digital network operation for businesses. Symbian is a joint venture with some of the world's biggest mobile phone companies. The Symbian operating system is used for next-generation mobile phones. Therefore, Psion lives in Symbian-powered smartphones.<sup>68</sup>

### BlackBerry

In early 1999 Research In Motion (RIM) introduced a new handheld device called the BlackBerry. This new device was actually an outgrowth of an older technology used for two-way interactive pagers. When first introduced the BlackBerry was essentially an oversized pager that allowed users to receive and send e-mails, text documents, and numerical messages. By 2000 RIM's PDA-sized BlackBerry was taking the market by storm. In particular, road warriors loved the always-on device that allowed them to be connected with e-mail on the road.

In late 2001, NTP filed an injunction to bar the BlackBerry from being sold by RIM in the United States. The Arlington, Virginia–based NTP owns 50 patents related to wireless devices and the systems behind them. NTP was created by inventor Thomas Campana as a holding company to protect his patents. RIM officials told investors in March of this year that the firm plans to spend another \$7 million to \$8 million on its legal battle with NTP.<sup>69</sup> The lawsuit has slowed the company's growth, and a recent negative ruling in September 2003 could spell continued trouble for RIM. Despite those difficulties the company has recently exceeded its income targets and has seen continued growth through distribution relationships with major wireless operators such as Cingular and T-Mobile.<sup>70</sup>

<sup>&</sup>lt;sup>70</sup> Richard Shim. CNET News.com, "BlackBerry Season Lifts RIM Outlook." September 8, 2003. http://news.com.com/2100-1041\_3-5072769.html?tag=fd\_top.



<sup>&</sup>lt;sup>68</sup> BBC News, "A History of Psion." Wednesday, July 11, 2001.

<sup>&</sup>lt;sup>69</sup> Ross Rubin. *eWeek*, "Why BlackBerry Is Getting the Raspberry." May 2, 2003. http://www.eweek.com/article2/0,4149,1238496,00.asp.

### Wearable Computing

A glimpse into the near future shows even greater change emerging in the mobile computing world. By 2005 the first practical wearable computing devices will hit the market. What are wearable computers? Here is a definition from Steve Mann's keynote address presented at the 1998 International Conference on Wearable Computing in Fairfax, Virginia, "A wearable computer is a computer that is subsumed into the personal space of the user, controlled by the user, and has both operational and interactional constancy i.e. is always on and always accessible. Most notably, it is a device that is always with the user, and into which the user can always enter commands and execute a set of such entered commands, and in which the user can do so while walking around or doing other activities."<sup>71</sup> Steve Mann should know. He is a pioneer in wearable computers who teaches at the University of Toronto. Steve became famous in the 1990s for roaming the Massachusetts Institute of Technology campus as a graduate student outfitted with chunky glasses that augmented his vision with a bulging, hip-mounted PC that boosted his memory; and an antenna that broadcast to the Internet whatever he saw.<sup>72</sup>

Motorola is working with MIT and Frog Design to create new wearable computing devices that will hit the market in 2005.<sup>73</sup> Among the devices Motorola is proposing are a voice-driven personal digital assistant that wraps around the wrist like a watch, a miniature digital camera that can be worn on any piece of clothing and can send images to be viewed on the "wristable," an intelligent pen to capture handwriting, a set of sunglasses with a color digital display built into one lens, and a wireless earbud and microphone. Sometime in the next few years it is not inconceivable to imagine the average travel professional communicating with their frequent-traveler customers who use a wearable personal computer system that connects to a broadband wireless network.

<sup>&</sup>lt;sup>73</sup> Rhonda Ascierto. Biz Inc, "Motorola Wears Technology on Its Sleeve." http://www.svbizink.com/headlines/article.asp?aid=4644&iid=303.



<sup>&</sup>lt;sup>71</sup> Steve Mann. University of Toronto, May 12, 1998. http://about.eyetap.org/fundamentals/.

<sup>&</sup>lt;sup>72</sup> Declan McCullagh. CNET News.com, "Cyborgs Unite." August 27, 2003. http://news.com.com/2008-1082-5067011.html.

## Wireless Initiatives in the Travel Industry

### Introduction

Wireless applications for travel have been on a roller coaster ride within the industry. September 11, 2001, a horrible day for the world, initiated a major shift in focus for the mobile travel industry. The U.K.–based Eye for Travel exhibit group was set to launch a brand-new conference titled "Wireless in the Travel Industry 2001" in Los Angeles, California, that very day, September 11, 2001. The event promised to bring together travel industry executives with the wireless industry in a new forum that addressed solely the growth and application of wireless technology in the industry. Talk about bad timing. Of course, this forum was cancelled and, more important, so were many wireless travel initiatives.

Historically, wireless travel applications can be grouped into three broad categories:

### **Alerts and Notification Services**

An early common application of wireless technology in a travel environment is the use of short messages to notify travelers of changes in their itineraries. This includes electronic itineraries sent to the traveler's pager, cell phone, or wireless PDA. These types of applications have been successfully deployed by online and traditional travel agents and a variety of travel suppliers.

#### **Reservation Applications**

Many believe that the next logical travel-oriented wireless application is to move the reservation process to the mobile device. A common mistake made with many travel-oriented wireless initiatives is the attempt to simply move the desktop application to a wireless environment. Do travelers really want to book or change their reservations on their cell phones? The travel landscape is scattered with many unsuccessful attempts at taking Web applications to the mobile environment, but bright spots do exist.



#### **Location-Based Services**

Location-based services (LBS) are an emerging area of mobile travel application development. LBS has the potential to be the "killer app" for the frequent traveler. Location-based traveloriented applications could provide a virtual concierge to the hotel guest, added services during a vacation or business trip provided by the online or traditional travel agency, or specific opt-in promotions from travel suppliers. The potential of LBS in the travel industry is limitless and represents a significant opportunity for application growth during the next 12–24 months.

#### Selected Travel Wireless Initiatives

Almost all travel suppliers and intermediaries have had some level of wireless development and deployment. The projects below are just a sampling of some of the successful and less successful attempts to bring wireless functionality to the frequent traveler.

#### **Global Distribution Systems**

As the traditional backbone for travel e-commerce, global distribution systems (GDS) have implemented a variety of applications. All offer electronic itineraries that can be downloaded to wireless devices as well as reservations applications.

#### Amadeus

As part of its e-travel subsidiary, Amadeus offers corporate customers an application called e-Travel Mobile, which allows travelers to make new travel arrangements, review existing travel plans, and obtain flight status on a variety of mobile devices. A dependence on WAP has limited the use of this product, and currently Amadeus is not enhancing the wireless service, waiting for the market to mature.

#### Galileo

In 2000 at the height of the travel industry wireless buzz, Galileo International launched a major wireless initiative for frequent business travelers. The application allowed travelers to access, cancel, and rebook reservations on two-way pagers, WAP-enabled cell phones, and Web-enabled PDAs. The application was an adjunct to the Galileo corporate self-booking project. That



product was displaced by the Cendant acquisition of both Galileo and Highwire (now called TravelPort). The application is still available, but because of its dependence on WAP adoption, overall market acceptance has been limited.

#### Sabre

Sabre has always had a focus on technology innovation with the dedicated internal research and development group called Sabre Labs. In September 2002 the company announced the introduction of "Sabre Inform" mobile services, a suite of customer service tools intended to reduce costs associated with call center management and customer services for both airlines and the North American travel agent community by keeping them connected with their travelers.<sup>74</sup> Sabre said the new mobile services quickly provide travelers with real-time information on any wireless device, either to plan a trip or to retrieve information. In August 2003 Sabre announced it had signed an agreement with Motorola to power Motorola's Mobile Office Solution with travel and ticketing capabilities for mobile professionals. Motorola has integrated Sabre's wireless travel services as part of the Travel Connector component of its Mobile Office Solution.

#### Worldspan

Worldspan has been developing wireless applications for the past 4–5 years. Initial development was in conjunction with Motorola for a WAP-based reservation application. That application was not widely accepted because of the limitations of WAP. Worldspan is the leading provider of e-commerce solutions to the online travel industry, powering major travel sites such as Expedia, Orbitz, and Priceline. Through these relationships Worldspan is working with key online customers to develop next-generation mobile applications that use messaging and voice-enabled technology to automate the process of alerts and reservations.

<sup>&</sup>lt;sup>74</sup> m-Travel.com article, "Sabre Launches Mobile Customer Services." September 3, 2002. http://www.m-travel.com.



## Airlines

## **Airline Mobile Applications**

All the major airlines have implemented wireless functionality that works on PDAs and mobile phones. In major cities at most airline airport lounges Wi-Fi hotspots are now available. Below is a brief sampling of specific initiatives offered by the major U.S. carriers:

- American Airlines provides a free electronic download of flight schedules in a variety of formats, including Palm OS, PocketPC, and WAP phones. Once a timetable is downloaded, the format allows travelers to print customized timetables between cities that fit their interests.<sup>75</sup> In April 2003 American Airlines announced an expanded mobile channel with My AvantGo offering up-to-the-minute flight schedule and loyalty program information for frequent fliers. The American Airlines M-Business Channel is a mobile Web site that provides customers with wireless access to flight schedules, important contact numbers, Admiral's Club locations, and AAdvantage Travel Awards Program details using Pocket PC and Palm OS handheld devices. In addition, customers can subscribe to American's exclusive Net SAAver fares directly from their handheld devices.<sup>76</sup> American was also one of the first airlines to offer Wi-Fi hot spots at its Admiral Clubs.
- Continental offers a variety of mobile tools for both the Microsoft Pocket PC and Palm OS wireless devices. These tools provide flight status, flight schedules, availability, OnePass status and mileage balance, eTicket itineraries, and Continental News and Offers.<sup>77</sup> Verizon Airfone has equipped Continental Airline's narrow-body fleet with its JetConnect service, which supports instant messaging and wireless messaging. The IM enhancements to the

<sup>&</sup>lt;sup>77</sup> Continental Airlines Web site, "Handheld PDAs." http://www.continental.com/travel/wireless/pda.asp.



<sup>&</sup>lt;sup>75</sup> m-Travel article, "American Airlines Offers Timetables for Handhelds." November 13, 2002. http://www.m-travel.com/21113.shtml.

<sup>&</sup>lt;sup>76</sup> m-Travel article, "American Airlines Adds AvantGo Mobile Channel." April 14, 2003. http://www.m-travel.com/30414.shtml.

already installed Airfone are designed to help better differentiate Continental's service from that of competitors.<sup>78</sup>

- Through a program called SkyMiles Virtual Check-In, Delta Air Lines frequent travelers can complete flight check-in via a wireless Palm OS-powered handhelds or Web-enabled phones for all flights on its U.S. route system.<sup>79</sup> Delta employees can check their account balances, transfer funds, and review transaction history at the Delta Employees Credit Union using the Air2Web Mobile Internet Platform.<sup>80</sup>
- Northwest Airlines has customized its Web site for handheld computers and wireless browsers. Most WAP phones and PDAs can easily view a condensed version of nwa.com. Services available on Northwest's wireless platform include flight and gate status, with current weather, flight status notification, WorldPerks Account balance, and Elite Upgrade status messaging as well as the ability to view and change travel reservations, timetable downloads, airport maps, and Northwest Airlines contact information.<sup>81</sup>
- United Airlines' Easy Update gives customers the option to decide how they receive information on their trip, the kind of information they can receive, and when they receive updates on their travel. Since the late 1990s United Airlines' customers were able to receive updates on a text pager or e-mail-enabled phone or PDA, but were limited as to when they got updates on travel. EasyUpdate allows travelers to receive a phone call at home, at work, or on their cell phones; receive an e-mail message; or receive a message on their fax machine, text pager, or other wireless device.<sup>82</sup>

<sup>&</sup>lt;sup>82</sup> m-Travel article, "United Airlines Launches Wireless EasyUpdate." March 20, 2002. http://www.m-travel.com/20320.shtml.



<sup>&</sup>lt;sup>78</sup> Planet.com—Instant Messaging in the Enterprise, *"Verizon IM-Enables Continental Airlines."* http://www.instantmessagingplanet.com/wireless/article.php/2197221.

<sup>&</sup>lt;sup>79</sup> m-Travel article, "Delta Expands Wireless, Web and Phone Check-In." August 21, 2001. http://www.m-travel.com/10821a.shtml.

<sup>&</sup>lt;sup>80</sup> m-Travel article, "Wireless Financial Services Offered on Air2Web Platform." August 24, 2001. http://www.m-travel.com/10824.shtml.

<sup>&</sup>lt;sup>81</sup> Northwest Airlines Web site, "nwa.com From Anywhere." http://www.nwa.com/services/handheld/.

### In-Flight Wireless Connectivity

Connexion by Boeing provides high-speed, two-way Internet-based connectivity to aircraft in flight. Commercial airline passengers were introduced to the service in the first quarter of 2003, when both Lufthansa German Airlines and British Airways began three-month service demonstrations. Japan Airlines and Scandinavian Airlines System have announced plans to equip long-range jetliners in their fleets with the service beginning in 2004. Boeing's full-scale launch of the Connexion service is scheduled for early 2004, beginning with trans-Atlantic and Asia–Europe routes.<sup>83</sup>

In June 2003 Boeing and Lufthansa Technik received aircraft certifications from German aviation authorities and the U.K. Civil Aviation Authority that will enable the use of airborne wireless applications on select commercial flights using the Connexion by Boeing mobile information service. These rulings are a significant step toward allowing passengers to use their own 802.11b Wi-Fi devices in the airline cabin environment.<sup>84</sup>

## Car Rental

Car rental vendors have long used wireless handheld devices for rapid return services. On the consumer level, focus has been on in-vehicle navigation systems. The next logical step is to incorporate these features into existing wireless devices. Here's an example: in July 2003 Avis Rent-A-Car System and Motorola announced that they will make the Avis Assist phone-based navigation system available in up to 50 cities across the United States and Canada. Avis Assist, developed by Motorola, allows Avis customers to rent a Motorola phone with a location-based navigation service that literally "talks them through" directions to a destination, broadcasting street names and maneuvers along the way.<sup>85</sup>

<sup>&</sup>lt;sup>85</sup> m-Travel article, "Avis Offers Motorola Navigation in US, Canada." July 28, 2003. http://www.m-travel.com/30728.shtml.



<sup>&</sup>lt;sup>83</sup> Connexion by Boeing Web site, Connexion Background. http://www.boeing.com/connexion/backgrounder.html.

<sup>&</sup>lt;sup>84</sup> m-Travel article, "Boeing, Lufthansa Cleared for In-Flight Wireless." June 4, 2003. <u>http://www.m-travel.com/30604.shtml</u>.

## **Travel Agencies**

Pioneered by online travel agent Travelocity, the concept of flight notification on pagers soon became a standard offering for online and offline agencies as well as airline suppliers. Available free with any Travelocity.com booking, the messaging service gives travelers, and anyone else they may designate, instant information by e-mail on most handheld devices and mobile phones. Travelocity and its partner Yahoo! Travel offer mobile wireless applications for both booking travel and travel guides.<sup>86</sup>

On the more traditional agency side of the business, Travel Incorporated announced a new mobile initiative last year that enables customers to receive travel delays, changes, security warnings, and their full travel itineraries on any SMS phone, PDA, or Web-enabled phone.<sup>87</sup>

## Hospitality

With Wi-Fi networks becoming a standard amenity (whether complimentary or paid) at major hotel chains and smaller individual properties, wireless connectivity is already playing a major role in the hospitality industry. Like other sectors of the travel industry, wireless initiatives in the hospitality sector tend to fall into operational and guest services.

## **Operational Efficiencies**

Wireless check-in applications implemented by chains such as Wyndham have brought new efficiency to the guest check-in and -out process. Arriving guests are greeted curbside and asked for their names and a credit card. A wireless Palm device is then used to obtain credit card authorization, record the guests' signatures, and program guest room key cards. On check-out, wireless printers print the guest folio and a receipt.<sup>88</sup>

<sup>&</sup>lt;sup>88</sup> Micros.com Web site, press release "Wyndham Continues Rapid Deployment of Guest Friendly Technology With the Addition of Micro's OperaPalm for Wireless Check-in." http://www.micros.com/press\_room/press\_releases/pdf/wyndham\_checkin.pdf.



<sup>&</sup>lt;sup>86</sup> Beth Cox. Internet.com, "Yahoo! Travel Expands to Web Phones." March 14, 2001. http://www.internetnews.com/ec-news/article.php/713001.

<sup>&</sup>lt;sup>87</sup> m-Travel.com article, "Travel Incorporated Goes Wireless with Air2Web." June 15, 2002. http://www.m-travel.com/20715.shtml.

Another example of wireless innovation is at the Hilton Hawaiian Village on Waikiki Beach. The concierges and customer service representatives at the 3,432-room resort have been outfitted with wireless and wearable computers. Xybernaut Corporation worked with Hilton Hotels to selectively deploy a new technology that brings check-in, check-out, and other hotel services to where they're most convenient for the guest.

At Starwood's W hotel in New York's Times Square the housekeeping staff have wirelessenabled HP iPaq handheld computers that allow them to communicate when they've completed servicing a room, indicate what supplies they need, and find out what room they need to go to next. Starwood is also testing wireless access for waiters at the 10-acre Sheraton Bal Harbour Beach Resort in Florida. The pilot project equips waiters with wireless iPaqs to take guests' food and drink orders anywhere around the pool or in the restaurants. The device transmits the order to the kitchen, and servers will deliver the food and drink, essentially doubling the time that waiters will be able to spend taking orders instead of ferrying orders to the kitchen.<sup>89</sup>

#### **Guest Service**

In just a short 12 months Wi-Fi has become the hottest technology in the hotel industry. According to Pyramid Research the number of Wi-Fi hotels will reach 5,000 by the end of 2004. <sup>90</sup> One reason for this meteoric rise in Wi-Fi is that it is less expensive to install Wi-Fi services than to individually wire guest rooms. Pyramid went on to predict that the number of hotels with Wi-Fi will surge to roughly 25,000 globally by 2007.<sup>91</sup> The adjunct services associated with this new wireless ubiquity have not yet emerged, but a wireless broadband connection with the hotel guests provides a myriad of opportunities to improve hotel services.

<sup>&</sup>lt;sup>91</sup> Ibid



<sup>&</sup>lt;sup>89</sup> Howard Baldwin. *iQ* Magazine, published by Cisco Systems, "The Travel Industry's Journey Forward." May/June 2003.

http://business.cisco.com/prod/tree.taf%3Fasset\_id=92831&ID=85955&ListID=44756&public\_vie w=true&kbns=1.html#top.

<sup>&</sup>lt;sup>90</sup> Robyn Greenspan. Internet.com, Wi-Fi Planet, "High-Speed Hotel." August 28, 2003. http://www.wi-fiplanet.com/article.php/3069901.

## **Technology Company Initiatives**

### Cisco

The networking giant Cisco is actively implementing wireless networks on a global basis helping customers expand beyond their wired infrastructure. Cisco has and is helping hoteliers, airports, and cities implement wireless networks as an extension of their IP-based systems. For example, Cisco is working with W Hotels implementing IP telephones in guest rooms that can access the room-service menu, request maid service, review room charges, receive facilities information, check flight schedules, and read about local third-party services. This information can be delivered in different languages.<sup>92</sup> Hooking these types of services into a wireless environment is a logical extension of this process.

The company has launched the "Cisco Hotspot Locator." This application allows a user to type in a city name or destination address and easily find the nearest wireless hotspot. A broad search can be done or it can be limited to entities such as airports, hotels, convention centers, coffee shops, restaurants, or bookstores. The results are categorized, indicating the city, connection type, service provider, and distance from the address provided, within a selectable radius of from 5 to 100 miles.<sup>93</sup>

Intel

Intel's new Centrino mobile technology incorporates features that enable extended battery life and is optimized for a range of thinner, lighter notebooks. These notebooks have integrated 802.11b LAN capabilities that eliminate the need for adapter cards. Centrino notebooks combined with the Microsoft Windows XP operating system automatically locate available Wi-Fi hotspots, allowing users to easily access available Wi-Fi networks. The Centrino technology is a demonstration of Intel's commitment to Wi-Fi and is directly targeted at the frequent business

<sup>&</sup>lt;sup>93</sup> Ibid.



 <sup>&</sup>lt;sup>92</sup> iQ Magazine, published by Cisco Systems. Interview with Pravin Raj, head of Cisco Transportation Practice, "From Cisco: Technology Changes Travel."
 http://business.cisco.com/prod/tree.taf%3Fasset\_id=92831&ID=85955&ListID=44756&public\_vie w=true&kbns=1.html#top.

traveler. Intel provided advertising muscle to promote Wi-Fi connectivity in airports throughout the United States.

**Siemens Mobile Travel Solutions** 

Siemens Mobile Travel Solutions is a joint venture founded in October 2000 by Siemens Information and Communication Mobile and Siemens Business Services. Siemens Mobile Travel Services creates and deploys preconfigured travel platforms and applications. Siemens Mobile Travel Solutions targets first-class travel service providers, ISPs, and mobile operators, by enabling them to supply mobile travel planning and booking services as well as locationdependent and personalized information. Furthermore, the company addresses enterprises that want to optimize travel-related costs by enabling their employees to manage their business trips on the way.

### **Independent Software Companies**

#### Aeritas

Aeritas is a software technology company focused on mobile commerce. Aeritas's FreedomPass uses voiceprint verification and an electronic bar code boarding pass linked to a photo ID, to enable faster boarding, improved security, and greater customer service by airlines.<sup>94</sup> The technology was launched in November 2001. Features of FreedomPass include a voiceprint biometric, bar code boarding pass linked to a photo ID, and an ability to integrate with government watch lists. The technology has the potential to ease airport congestion by fast-tracking frequent flyers through the check-in process. Aeritas has agreements in place with Sabre and Siemens to market the Aeritas wireless check-in solution to U.S. and European airlines. Lufthansa has announced that it would deploy its wireless check-in service (m-barq) using Aeritas technology.<sup>95</sup>

<sup>&</sup>lt;sup>95</sup> Rory Doherty. NextInnovator.com article, "Aeritas Flying High After 9/11." November 25, 2002. http://technologyreports.net/nextinnovator/?articleID=895



<sup>&</sup>lt;sup>94</sup> m-Travel article, "Aeritas Launches Secure Wireless Check-in with Barcode." November 9. 2001. http://www.m-travel.com/11109.shtml.

## Air2Web

Air2Web is a wireless platform provider. The company has a number of initiatives in the travel industry. In March 2003 Air2Web launched a new product called 2IM, a mobile instant messaging service that integrates popular public and corporate IM services. 2IM provides employees with interoperable wireless access to all pubic IM services, such as America Online IM, MSN IM, and Yahoo IM, as well as enterprise IM Services. 2IM is available on Palm devices, Rim wireless handhelds, and Cingular Wireless's myBiz pagers.<sup>96</sup>

### Avantgo

AvantGo provides interactive and personalized content and applications to handheld and Internetenabled phone users. Eight million subscribers use the AvantGo mobile Internet service to access more than 2,500 content channels that have been optimized for mobile devices. Optimized channels include news, stock quotes, flight schedules, movie listings, restaurant reviews, maps, weather, and much more from brand-name content providers and e-businesses. Avantgo provides 85 travel-related services. These include airline sites such as American, British Airways, and Singapore; dining services such as iDine Rewards; a variety of guides including Conceirge.com from Conde Nast; mapping services such as Mapquest; hotel reservations from Accor Hotels; and weather from AccuWeather.com.<sup>97</sup>

## Centerpost

Centerpost Corporation provides outbound IVR and multichannel alerting solutions to leading companies such as United Airlines and Travelocity. Centerpost's interactive communications technology enables clients to deliver interactive messages to any wired or wireless device.

 <sup>&</sup>lt;sup>96</sup> Air2web press release, "Air2Web Launches 2IM, a Secure, Mobile Instant Messaging Solution Integrating Popular Public and Corporate IM Services." April 21, 2003. http://www.air2Web.com.
 <sup>97</sup> Avantgo Web site, "Travel." https://my.avantgo.com/browse/858/.



## OpenGrid

OpenGrid provides highly scalable wireless applications designed for the global lodging and travel industries. The company's FastBook product is a transaction-based wireless platform that enables hotels and hospitality companies to extend their online hotel database and booking engine to mobile devices.<sup>98</sup> FastBook is deployed with Hilton Hotels, and OpenGrid has recently announced an agreement with Lexington Services, a hospitality reservation, electronic distribution, and channel management company. With FastBook deployed at Hilton, customers can access wireless information and reservation services at 350 U.S. Hilton, Hilton Garden Inn, and Conrad hotels. Members of the Hilton HHonors guest loyalty program can access their preloaded account profiles easily on their mobile devices. <sup>99</sup>

## STSN

STSN is a leading provider of wired and wireless Internet broadband services to the hospitality industry. More than a quarter million business travelers rely on STSN to increase their productivity with secure, easy-to use, high-speed connectivity options in more than 150,000 guest rooms and 4,800 hotel meeting rooms every month. STSN provides wireless connectivity to Marriott hotels in the United States, the United Kingdom, and Germany. STSN's iBAHN wireless Internet hot spots are deployed at over 370 hotel properties. STSN iBAHN delivers dual-band (802.11a and 802.11b) high-speed Internet access technology to common areas and conference/meeting rooms in STSN's partner hotels.<sup>100</sup>

<sup>&</sup>lt;sup>100</sup> STSN Web site press release, "STSN's Network of Wireless Hotspots Now Deployed at 370 Hotels." April 15, 2003. http://www.stsn.com/pages\_corpInfo/\_releases/hotspots\_041503.htmle.



<sup>&</sup>lt;sup>98</sup> OpenGrid Web site, http://www.opengrid.com.

<sup>&</sup>lt;sup>99</sup> m-Travel, "OpenGrid Adds WAP Support for Hilton's Wireless Reservations." October 1, 2001. http://www.m-travel.com/11001a.shtml.

## Vindigo Studios

Vindigo Studios develops and publishes consumer information and entertainment applications for mobile devices. More than one million people have downloaded versions of Vindigo for wireless phones and PDAs powered by Palm OS, Pocket PC, BREW, or Java. Vindigo makes it possible to search for restaurants, bars, theatres, and shops in the vicinity of a location, using Palm, Pocket PC, and mobile telephones. Location information includes directions and evaluations by other Vindigo users.

## European Trials and Research

The European Commission has funded a number of research projects designed to enhance the travel experience through the use of advanced mobile technology. The following are a few of the European wireless initiatives.

## Germany—Crumpet

CRUMPET (creation of user-friendly mobile services personalized for tourism) is an EU-funded project on mobile technology for tourism. The goal of the project is to implement, validate, and test tourism-related value-added services for nomadic users across mobile and fixed networks. CRUMPET uses agent technology for seamlessly accessible nomadic services. Partners from Germany, Finland, the U.K., and Portugal have worked on a platform for tourism-related services supporting intelligent, anytime, anyplace communication suitable for networks like those a typical tourist user might be exposed to now and in the near future (including IP networks, Wireless LAN, and mobile networks supporting WAP technology: GSM, GPRS, and UMTS). The target devices are lightweight terminals such as next-generation mobile phones and PDAs.<sup>101</sup> The CRUMPET project ended in November 2002 after successful trials of the system at two European locations.

<sup>&</sup>lt;sup>101</sup>, Hidir Malaka Aras and Alexander Rainer Zipf. EML Research site, "2.1.8 CRUMPET." http://www.eml-research.de/english/Research/Memory/6.



## Italy—Palio

Palio is a project funded by the Economic Commission's Information Society Technologies. The goal of the project was "to create an open system for accessing and retrieving information without the constraints and limitations imposed by space, time, or access technology."<sup>102</sup> The mobile communication network is the Palio system's main telecommunications infrastructure. The communication platform supports wired as well as wireless telecommunication networks. In the Palio project each user accesses information with a familiar mobile device. For tourism, the project has identified the following functions travelers need:

- Plan a visit (e.g., transportation, hotels, restaurants, sites of interest).
- Navigate in the city environment (e.g., itineraries in the city and, in real-time, the traffic situation and availability of parking spaces).
- Enjoy the sites they are visiting (e.g., historical and cultural information).
- Find services in the environment (e.g., banks, pharmacies, and public services).
- Acquire detailed documentation about the visited sites after the visit.

Switzerland—Paramount, Swiss National Park [head level 4]

The "Paramount" (public safety and commer<u>c</u>ial info-mobility applications and services in the mountains) project is supported by the European Commission's Information Society Technologies (IST) program for the Swiss National Park. The goal of the project is to develop a comprehensive LBS for hikers and mountaineers in the Alps and Pyrenees. The project has three components information, safety, and data collection. The location-based information provides hikers in the park with local information and navigation functions. This includes routing, 3D views of surrounding areas, information on points of interest (huts, summits, public transportation stations, etc.), and local weather forecasts. The safety component of the project provides relevant

<sup>&</sup>lt;sup>102</sup> Pier-Luigi Emiliani, Michael Pieper, and Constantine Stephanidis. ERCIM News Online Edition, "Anyone, Anywhere Access to Community-oriented Services." July 2001. http://www.ercim.org/publication/Ercim\_News/enw46/emiliani.html.



information on thunderstorm warnings, avalanche risks, and severity of specific trails. The system allows for tracking registered users in dangerous terrains and alerting and coordinating search and rescue services in emergency cases. The third component collects information from participants on trails logged as well as their personal evaluations of the severity of specific trails and updates on specific points of interest. The mobile TourGuide prototype is based on a pocket PC or smartphone as core terminal, with additional modules for positioning, communication, and heading determination. After a successful completion of the Paramount project, the ultimate goal is to establish a commercial service in some appropriate regions of the Alps and Pyrenees, offering these mobile services to all interested hikers and mountaineers.<sup>103</sup>

#### Japan

NTT DoCoMo's i-mode is the model not only for Internet-based mobile communications but also for practical LBS that travelers would find valuable. I-mode has a number of location-based information guides that have been part of the service for some time. The i-mode platform supports color maps with detailed turn-by-turn directions specifying street-level detail of a destination. This offers greater legibility than monochrome WAP phones. I-mode includes content from Northwest Airlines, Disney, Zagat, and Travel Maps.

NTT's competitors have also launched a variety of location-based services. "Loco Guide" uses the J-SKY (J-Phone) mobile Internet to bring a broad range of local information to customers based on their current locations. Loco Guide searches for location-specific contents so users can quickly obtain information on transportation, restaurants, leisure spots, banks, hospitals, and other services. Previously, users had to search different J-SKY content services to obtain location-specific information. However, Logo Guide accesses the contents of multiple sites simultaneously, thereby eliminating the inconvenience of searching different sites to find relevant information. Users are able to search for information in a current location and, by changing the search location; they can also search for information in virtually any area in Japan.

<sup>&</sup>lt;sup>103</sup> Paramount Web site, "Project Overview." http://www.paramount-tours.com.



### **Summary and Analysis**

#### The Eternal Dilemma: Return on Investment vs. Enhanced Services

In the heyday of the dot.com frenzy the tech industry was littered with initiatives with no clear return on investment (ROI). Projects were often pursued that were based on a questionable business idea or on the perceived need to beat the competition. In three short years the environment has so dramatically changed that it is now difficult to secure funding even for projects that are clearly revenue producers. Wireless initiatives have been particularly hammered in these tough times, as many mobile projects have been viewed as added-value services rather than critical revenue-producing initiatives and thus delayed or abandoned. In the travel industry, which has been fighting a depression-level economic downturn, the overwhelming focus has been on reducing costs. Wireless technology projects whose main goal is to provide enhanced services have been delayed or cancelled. The only exception to this trend has been the meteoric rise of Wi-Fi hotspots at airports and hotels. But even the emergence of hotspots has often had a limited focus, where suppliers define the Wi-Fi service as an amenity for the frequent business traveler rather than a new platform for communication and value added services. The primary debate has been on whether the businessperson will pay for the service or receive it free as a value-added amenity. One important aspect of the Wi-Fi industry rollout is research that has shown that for the frequent business traveler broadband connectivity (wired or wireless) is an important factor in hotel selection. In this respect wireless hotspots are no different from other amenities such as fitness or business centers. Amenities do make a difference to the frequent traveler, but where's the ROI? What about the need to reduce distribution costs?

Here's where wireless reservations have taken a central role. The problem with wireless reservations has been a question of functionality. Finding the right balance between effective user design and function has been a challenge for firms developing wireless reservation applications. Users' patience with multiple Web screens is much different from their tolerance for navigating reservations options on a mobile phone. Reservations applications do have a role in the wireless



world, but to be effective, the platform must use personalization techniques and rich user interfaces to simplify the process and provide added value to the user.

For years, travel e-commerce veterans described their "true" competition as the traditional offline telephone process. Clearly, given the growth of online travel, sites such as Expedia and Travelocity have figured out how to provide a user experience that is richer than the offline process. This same issue is more acute when it comes to mobile technology. After all, travelers have a communication device, a telephone, in their hands. Is the reservation application faster than picking up the phone? Given the limits of traditional interfaces such as WAP, this was often not the case. To be successful the industry needs to return to the concept first suggested by John Scully with the Navigator video, a digital assistant who retrieves travel information on behalf of its user and provides a limited set of information to enhance the travel reservation process.

Another untapped angle in this revised mobile reservation scenario is the opportunity for the supplier to provide special amenities to its best customers. Imagine the satisfaction of frequent hotel guest when they receive an SMS or MMS message to their cell phone indicating that they've been upgraded to the concierge level while they are in the taxi heading to the hotel. Obviously this type of interaction will take some work, though some of the elements can be found in systems like the one OpenGrid has developed for Hilton Hotels.

Although value-added services have a lower immediate ROI, there exists an untapped opportunity to provide differentiated services to the best customers at the right time using emerging mobile technology. This can have a direct impact on creating greater customer loyalty, a key goal of any travel supplier. For example, as any casual observer will note, the first thing frequent travelers do when they arrive at their destination is to turn on their mobile phone. What a great opportunity to use emerging technology to communicate vital information to those frequent travelers. Perhaps the travel agency will send a message with ground transportation information or an interactive map of the arrival city.



An essential aspect of all these message-oriented initiatives is they must be strictly deployed on an opt-in basis. No supplier or intermediary wants to be perceived as adding to the problem of spam. Finding the right balance between interactive messaging and commercial promotion will be difficult. Travel suppliers and, to a lesser extent, travel intermediaries already have a database of personal preferences stored in the customer's loyalty profile. If not already part of the process, loyalty customers need to be asked whether they would be willing to receive messages on their mobile devices.

#### Technology Conclusions

#### The Smartphone Will Emerge as the Mobile Standard

The line between the smartphone and the wireless PDA will continue to blur. The importance of an integrated device was clearly reinforced by Palm's purchase of Handspring. The focus of Microsoft on the newly announced smartphone in Europe and the recent agreement with Motorola shows Redmond's interest in these new devices. Products such as the Samsung SGHi500 smartphone incorporate the Palm OS into a more traditional-looking mobile phone. In the near term, devices may still be classified as wireless PDAs rather than cell phones, but this distinction will soon disappear. That is great news to the travel industry, as a mobile phone is considered a mandatory carry-on item by all frequent travelers.

#### Seamless Roaming Will Be the Norm

"As far as devices are concerned, there will be chipsets that will permit EV-DO and GSM technologies to work together in the same devices. These chipsets will provide the ability to use, for example, a GSM network for voice, the EV-DO network for high-speed data and when out of NextWave coverage, GPRS for slower-speed data access. The same will be true for CDMA voice-and-data networks, and soon customers will be able to move from Wi-Fi to EV-DO, GPRS and CDMA2000 1X supported by devices and backend servers that will make this type of roaming fairly seamless. - Andrew M. Seybold

I agree with Andrew Seybold, a leading analyst of mobile technologies, that ubiquity will emerge allowing a single smartphone device to cruise seamlessly between various 2.5 and 3G networks as well as Wi-Fi LANs.

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Here are some recent news items that support that hypothesis:

- Nextel Communications plans to offer wireless phones that enable users to make calls over Wi-Fi networks as well as Nextel's iDEN network. Motorola is developing the devices.<sup>104</sup>
- Smartcard vendors such as Gemplus are incorporating a new security standard that allows mobile phones to securely roam Wi-Fi networks. Gemplus is integrating a technology called extensible authentication protocol into wireless smartcards that allows consumers to roam between cellular networks and Wi-Fi hot spots. Smartcards, which are found behind the batteries of cell phones, store a subscriber's account and billing information.<sup>105</sup>
- Wayport has signed roaming agreements with all the major wireless providers, allowing simplified billing through existing mobile phone contracts. Wayport has Wi-Fi roaming agreements with Verizon Wireless, AT&T Wireless, SBC, Sprint PCS, MCI, iPass, GRIC, and Boingo.<sup>106</sup>
- iPass has introduced technology to allow service providers such as carriers, mobile operators, and wireless ISPs to offer a single solution for disparate Wi-Fi and Ethernet networks. iPass also announced an agreement with Sprint, which is using iPass's Wi-Fi roaming platform for its PCS Wi-Fi access service.<sup>107</sup>

This trend is important to note for the travel industry. With the explosive growth of Wi-Fi hotspots and the acceptance of mobile phones as an essential travel companion, the ability to communicate with best customers has never been equaled in the history of global travel.

<sup>&</sup>lt;sup>107</sup> iPass news release, "iPass Wi-Fi Roaming Services Helps Carriers, Mobile Operators and WISPs Bring Wi-Fi to Market Faster." September 22, 2003. http://www.ipass.com/pressroom/pressroom\_releases.html?rid=65.



<sup>&</sup>lt;sup>104</sup> Stephen Lawson. PC World, "Nextel Details Plans for Wi-Fi Phones." March 17, 2003. http://www.pcworld.com/news/article/0,aid,109831,00.asp.

<sup>&</sup>lt;sup>105</sup> Ben Charny. CNET News.com, "Standard Roams the Wi-Fi, Cellular Range." April 3, 2003. http://news.com.com/2100-1035\_3-995406.html?tag=mainstry.

<sup>&</sup>lt;sup>106</sup> Wayport news release, "Wayport and Sprint Announce Wi-Fi Roaming Agreement." September 16, 2003. http://www.wayport.net/press/125.

#### **Internet Content Will Dominate**

The perceived battle between next-generation wireless networks (3G and beyond) and Wi-Fi LANs may create some confusion about the best platform for wireless software development. Should applications be developed in messaging platforms such as SMS and the emerging MMS? What about development in WAP? With Wi-Fi hotspots becoming commonplace, should the travel industry simply develop applications in standard Web authoring languages such as HTML, XML, Java, or Flash and wait until browsers are able to read full Internet content?

It is my belief that Internet content will be the clear winner in mobile applications. When the prototypical i-mode service was introduced in the late 1990s, developers were required to rewrite content in a stripped-down version of HTML. WAP development also required content to be rewritten using specific wireless markup language. With the emergence of mobile browsers from Opera, with their small-screen rendering technology, the mobile browser intelligently reformats Web sites to fit inside the screen width of a mobile device, thereby eliminating the need to rewrite the application.<sup>108</sup> As the market penetration of new smartphones continues to expand, their smart Web browsers will automatically reformat Internet content to fit the small screens. We've already seen the interaction emerging between mobile-phone-based messaging such as SMS and IM applications. The shortcoming of WAP is based partly on the limits in the way information is displayed. WAP applications have the hyperlink aspect of the Web, but lack the browser metaphor to navigate a screen quickly to find the relevant information customers need. Delivering rich Internet content on mobile devices will emerge allowing multimedia applications to provide rich content to smartphones.

One point of clarification, though it is this author's belief that Internet content will ultimately dominate mobile applications, expertise in building applications for wireless technology still requires a specialized skill set. Web-based applications cannot simply be applied to mobile

<sup>&</sup>lt;sup>108</sup> Opera Software ASA Web site, "Opera Small Screen Rendering." http://www.opera.com/products/smartphone/smallscreen/.



devices. Limits on the speed of the network, type of mobile browser, size of the displays, and limited data input capabilities all inhibit the traditional multi-step Web-based reservation process. To be successful wireless applications need to be written once, allowing the information delivered to whichever method the consumer desires. There are many software companies that can create and deliver applications on multiple wireless devices. Any serious mobile initiative in the travel space needs to be platform-independent and must employ permission-based marketing and personalization technology to simplify the mobile travel experience. Simply transferring the existing Web application to a mobile device has proved to be ineffective.

#### The "Killer Apps" for Mobile Travel

Emerging networks and smart devices will soon be in place to greatly enhance the mobile travel experience. But what are the "killer applications" that are going to drive the next wave in mobile connectivity innovation for the travel industry?

#### Alerts

Some of the killer apps are already with us. Notifying a traveler of flight changes or delays has been part of the travel process for some time. These services will become a necessary capability of all travel agencies and suppliers as mobile devices become more sophisticated. Travel management companies in the corporate travel segment have a unique opportunity to use alerts to ease the burden of the frequent business traveler. With the ability to look at the entire travel itinerary, alerts can help direct the traveler to the best alternatives when something goes wrong. This is a different metaphor from the self-service approach, whereby travelers are expected to rebook the itinerary themselves. This use of proactive notification can be perceived as a valued service that can differentiate travel management companies, and I anticipate that mobile applications will re-emerge as a competitive factor that will be touted by key suppliers. Alerts are also important for the leisure market, as vacation travelers will be comforted to learn of itinerary changes made on their behalf when things go wrong on their trips.



A key part of the solution has to be timely communication. Using IM technology that identifies that the traveler is "online" may be a critical piece of an effective solution. For example, while I was on a recent business trip I observed a somewhat bewildered traveler mention to a flight attendant that he had just received a message on his cell phone indicating that his upgrade had come through. Unfortunately, this message came too late as the first class cabin was already filled and the traveler was sitting in coach. Alerts are only as effective as the timeliness of their delivery and their ability to actually affect the travel experience.

#### LBS

LBS have the potential to be the killer apps in all sectors of the travel industry. But supplying the traveler with a map or list of local restaurants is just the first step in tapping the true potential of this emerging application category.

Location-Specific Information

Providing travelers with electronic maps that use GPS or cellular triangulation technology to pinpoint their position within the location is the most logical application of LBS for the frequent traveler. Many of the European trials such as Crumpet used this technique very successfully, allowing the traveler to navigate the town. A logical extension of this ability is to allow travelers to use their mobile devices to reserve or purchase specific products or services. For example, New York visitors could make restaurant reservations and purchase theatre tickets using their wireless devices. Some of this functionality already exists.

#### Situational Mobile Information

A key element of a successful LBS is the situational nature of the information. Information must be relevant to users based on their specific needs at the time and at their specific location. Over the years I have been involved with a number of discussions on wireless applications, and many have described a common shopping mall scenario in which a consumer walks by a store and is offered a special discount through an SMS (or eventually MMS) electronic coupon offered by the specific shops they pass. Unfortunately, I believe this concept corrupts the basic premise of



situational need for LBS. In a travel context, if the travel supplier is sending too many "special offers" travelers will soon shut off their mobile devices just to avoid the unwanted stream of commercial messages. How then can suppliers ensure that their message is situationally appropriate? Here is the beauty of the travel industry opportunity. By its very nature the travel experience is more structured because travelers depend on their itineraries to guide them through their trips. Traditionally, itineraries have contained basic flight, hotel, and car rental information, while leisure tour packages may also contain vouchers for various activities. An opportunity exists to allow leisure travelers to view an electronic version of this itinerary as the backbone of their vacation planning experience. In a different context, frequent business travelers depend on their personal information manager (PIM) to store and coordinate all their calendar appointments. Each type of travel presents a unique opportunity for situation LBS.

In the leisure travel industry, the travel provider, whether a travel agency, tour operator, or hotelier, could augment this itinerary through permission-based marketing messages around the specific activities. As part of the reservation process, whether electronic or through an agent, travelers should be asked whether they will permit specific wireless messages to be sent offering promotional discounts on activities during their trip. For example, when traveling to Hawaii many visitors want to attend a luau. An SMS or MMS message offering a discount for a specific luau could be sent to the traveler on an opt-in basis. The secret to the success of this type of situational offer may be to give travelers the ability to control and plan their activities through a mobile planning application. Travelers naturally engage in a planning process that needs to be tapped into by the provider. Leisure travelers will normally sit down with their families and plan out their desired activities while at a specific location (unless of course they are part of an organized escorted tour, but even then there is some value to this concept). What tools are used in this planning process? A variety of guides are available at the airport, from the hotel concierge, or provided by the travel agent. Travelers may then use their mobile phones to check the availability of various activities. Providing a planning tool that incorporates promotional discounts is one way to tap this natural planning process. In a hotel setting an interactive television display could be



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also used to assist the process, but the delivery of promotional coupons should be to the mobile device. Building a vacation planning tool is not a simple task. There is an obvious need to access all the content digitally, which may or may not be available. The ability for various activity services to accept and confirm reservations electronically may also prohibit the implementation of such a comprehensive planning tool. Creating the right application that can easily be navigated and used by the traveler requires a simple interface that is augmented by the physical world of brochures. Special discounts could be offered for specific activities when the reservation is booked via the mobile phone.

Combining LBS with specific situational needs could add value to the leisure travel experience in other ways as well. For example, a theme park visitor could monitor lines at various rides at the park. Resort guests could use their mobile devices to book golf tee times or order beverages on the beach. Messages could be sent to these travelers offering discounts on special services. What situational value do LBS applications have for the frequent business traveler? Frequent business travelers may have some desire to explore the city during their off-hours. For example, as a jazz player and enthusiast I would be open to receiving information about local jazz clubs. Another obvious application is a guide to local restaurants. To be of added value the restaurant information may be filtered to better meet the needs of the traveler. For example, restaurants could be rated based on their atmosphere for conducting business. Another more communityoriented approach is to have restaurants rated by other corporate travelers. Having the frequenttraveler community create ratings based on the needs of the business traveler (e.g., quality of food, service, and atmosphere for conducting business) creates a sense of community among the road warriors. Restaurant guides are not new to the world of wireless; the rating service Zagat first implemented an online service on NTT DoCoMo's i-mode in 1999 and offers its guide on the Palm OS, Microsoft Pocket PC, and the Brew programming language for mobile phones. The key to making this information more situation appropriate is not only to classify restaurants by their types of cuisine or their Zagat rating, but to also combine the location and personal preferences of users to filter the information based on their specific situational and personal requirements.



#### **Personalized Services**

To bring ultimate value to the traveler, the location-based information provided on the wireless device must be filtered to suggest options that correspond to personal preferences. The trend toward personalized interfaces began in the mid-1990s. Internet surfers are accustomed to the idea of "cookies," which store personal information on the individual's computer to track preferences. For truly personalized services, applications may deploy intelligent agent technology to retrieve specific data based on explicit or implicit customer preferences. Intelligent agents can be programmed to search, acquire, and store information on behalf of users' wants and needs. Travel suppliers have a unique ability to use existing frequent flyer or guest databases to help personalize information on mobile devices. Software developers such as Open Grid have already built connectivity systems such as the Hilton Honors frequent guest database. To become a true electronic customer relationship management (eCRM) mobile application, this information needs to be enhanced not only to track guest stays, but also to record traveler preferences, which can then be used to filter information based on the location-specific needs of the traveler. For example, it is easy enough to assume that a guest who stayed at a Bahamas resort and played golf may want to do the same at a property in Hawaii. Of course, this type of information may require integration between frequent guest databases and property-based systems, long a weakness in the hospitality industry.

#### SMS and MMS Marketing

Text-based messaging is already being successfully used by marketers. A recent survey by Nightfly of 18- to 35-year-olds measured consumer attitudes regarding mobile coupon offers. This U.K.-based survey asked respondents to rank SMS messages along with radio, direct mail, television, e-mail, and posters as a preferred form of advertising. The SMS messages ranked first at 39 percent. Andrew Wood, managing director of Nightfly, said that "the overwhelming preference to receive promotions via SMS is a sign of the increasing acceptance of SMS campaigns. It shows that, when an SMS campaign is carried out in a highly targeted, permission-



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based manner, consumers are accepting of the medium, do not find it intrusive, and are more than willing to receive further brand promotions providing they are relevant to their lifestyle.<sup>"109</sup> As MMS becomes more common multimedia coupons, including short video messages, will take the place of text-based coupons. This form of advertising is very useful for any perishable travel item or service and is a natural when combined with LBS. For example, convention attendees might receive a short SMS or MMS message offering discounts at local restaurants for that evening. These types of messages will be well received by the traveler provided that four factors are taken into account:

- Control-travelers need to have control on whether or not they receive messages.
- Easy bypass—travelers need to be able to bypass sales messages easily.
- Filtering of messages—travelers need the ability to customize the types of messages received.
- Mutual benefit—travelers need to get something back in return, such as a reduction in the cost of services.<sup>110</sup>

#### Market Segment–Specific Solutions

#### Airline/Airport

In the past 12 months there has been a dramatic growth of wireless hotspots at airports. Wi-Fi hotspots can now be found at most airline club lounges and at many gates. Secure Wi-Fi technology is also being deployed, bringing efficiency to the airline operation as well as public networks enabling new services to the consumer. In many cases wireless communication has been a key component of airport operations for some time. The new broadband wireless networks bring data along with voice to improve the operation and customer experience. Here are just a few of the ways wireless technology is and will be used in an airport setting:

 <sup>&</sup>lt;sup>109</sup> Mobile Youth, 2002. "SMS Marketing Preferred to TV and Radio by UK Consumers." August 2002. http://www.mobileyouth.org/news/mobileyouth578.html.
<sup>110</sup> Ihid



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### Operational

### Security

 Security personnel equipped with wireless handheld devices can access alerts, security databases, and intelligence information throughout the airport.

### Baggage handling

- Wireless-enabled ramp personnel can provide workers with up-to-the-minute information on airport operations.
- RFID tags (replacing current bar code technology) can be used for baggage handling and tracking.

### Aircraft maintenance

- Maintenance personnel can be equipped with wireless devices to check on parts availability and for diagnostic purposes.
- Dispatchers can use wireless technology to better manage personnel based on priority of need. Wi-Fi networks allow the visualization of all personnel to better manage services.

#### Public Use

#### Flight information

Alerts-delays, upgrade status, and customer service information.

### <u>Check-in</u>

- Roving mobile check-in devices used by airline personnel to eliminate lines.
- Self-service check-in—bringing the kiosk check-in to the wireless device combined with a bar code ticket to ease check-in lines
- Curb-side check-in—equipping curbside check-in with mobile devices, allowing for more personnel during peak times.

#### Internet access

• E-mail is still the killer app for the consumer.

#### Advertising services



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- SMS and MMS messages to offer special services to an airline's best customer.
- Offers from airport shops.

#### Hospitality

The hospitality industry has been the most aggressive travel industry segment in implementing wireless solutions to increase productivity and improve customer service.

### Productivity

### Wireless Check-in

Progressive hoteliers such as Wyndham have implemented wireless check-in and check-out capabilities. This functionality will become commonplace as hotels use their Wi-Fi networks to improve internal operations. This may lead to a re-evaluation of every aspect of hotel operations, including housekeeping, in-room dining, and maintenance. The mobile phone itself may soon be the electronic repository for keyless hotel entry or it may act as a means of commerce allowing guests to charge services on their mobile device.

#### Virtual Concierge

One clear opportunity for the hospitality industry is to automate the concierge via new emerging mobile technology and wireless networks. Traditionally, the role of a concierge has been a single source of guest information for the hotel and surrounding area. Trying to reach a concierge at a NYC hotel around dinner time is an exercise in frustration. The ability to employ enough concierges to meet peak demand is a never-ending battle for the hotel general manager. Instead, hotels need to digitize local content and make it available on their Web sites for all guests. This can be augmented by LBS to help with directions and filter information by personal preferences.

#### **Corporate Travel**

Business travelers' dependence on their PIM is the key to offering LBS to aid the road warrior when something goes wrong. When a flight is delayed, travelers should be provided with options that direct them to services to assist them. Airlines already try to provide a differentiated product



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to their best frequent flyers. Location-based messages to these customers could direct them to specific areas in the airport where they could receive faster service when delays occur. Travel agencies can use LBS combined with alerts to help the traveler with alternate options in the case of severe service disruption. To fully provide that level of service, integration with the traveler's PIM should be considered because changes to one aspect of a trip can affect the entire itinerary. As smartphones emerge as the standard mobile platform, the PIM will naturally be part of the device. Corporate travel management should spearhead the types of services that allow administrators to coordinate with travel agents, providing options that can be delivered to the traveler while en route. This is a dramatic departure from the mindset whereby travelers themselves make the changes on their mobile devices. This is still a noble goal, but until the combination of personalization, agent technology, and user interface is developed, current Webbased booking tools will not fare well in a mobile phone environment. A hybrid approach that pushes information to the traveler is more practical in the near term, provided the options meet personal preferences and corporate policies for the frequent traveler.

Convention and corporate meetings are another growth area for wireless communication. A variety of services can be deployed to enhance the communication between the buyer and seller as well as between convention attendees. Limited use of SMS and MMS messaging may play a role in the convention setting provided they can be managed on an opt-in basis at the time of registration. This permission-based marketing would need to go beyond simply allowing for messages to be sent but must correspond to specific "birds of a feather" interest groups that naturally form at conventions and large meetings.

#### **Enterprise Wireless**

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During the next 12–18 months companies will begin to deploy enterprise-level mobile strategies. Part of this effort will be providing information to employees while they are traveling. Corporate portals will be extended to wireless platforms, allowing all levels of the organization access to critical data on mobile devices. Just as corporate travel managers needed to integrate their efforts with corporate portal development, travel buyers now need to influence enterprise mobile strategy



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by working closely with their IT departments on an integrated travel management approach to new enterprise-level wireless initiatives.

#### Security

The No. 1 question asked by senior management on September 11, 2001, was "Where are my employees?" Mobile devices with GPS or that use cellular triangulation can help pinpoint employees' precise locations. This obviously has security value, but it does raise some issues of privacy.

#### **Resorts and Theme Parks**

#### Resorts

Resorts have a unique opportunity to use emerging wireless technologies to increase revenue by selling incremental activity services. Whether the destination is a ski lodge or an island golf resort, implementing Wi-Fi hotspots can help trigger new opportunities for enhanced guest services. Resorts often struggle with the best method to communicate activity options to guests. The standard concierge problem inherent at business-oriented properties is even more acute at resorts in which all information and bookings must flow through a central activities desk. Resorts need to digitize all activity content and make it available through mobile devices. This allows greater access and control by the guest and can help expand services. SMS or MMS marketing can also be deployed to promote specials for underutilized services.

For some areas, the decision to install Wi-FI hot spots may be made by the local government. For example, the resort municipality of Whistler in British Columbia, Canada, has decided to roll out "yodel," a communitywide Wi-Fi hot spot service. Whistler believes that Wi-Fi will give it an edge over other ski resorts.

#### Theme Parks

Like resorts, theme parks can offer specials and promote activities through wireless networks. The simple ability to check on wait times at rides may be the single killer application for the theme park industry. Who hasn't seen the comedian who describes a trip to a theme park as a long wait

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with a very short burst of excitement? Managing customers' experiences through the use of wireless communication is an unexplored opportunity for theme park operators. As with resorts, promoting specific shows and activities can be an important added service enabled by SMS or MMS messaging for the theme park industry.

#### Concerns

### Wireless Spam

More than 80 percent of the 950 million messages sent to DoCoMo's mobile e-mail service each day are unsolicited, according to an NTT DoCoMo spokesman.<sup>111</sup> What is even worse is that the more than 37 million DoCoMo i-mode wireless customers must pay for these e-mails, leaving DoCoMo holding the bill for network costs if a randomly generated address on a message does not exist. Wireless spam could significantly affect the acceptance of all mobile travel applications. Users view mobile phones as a more personal point of contact than e-mail, and therefore mobile spam may be viewed as a greater invasion of privacy.<sup>112</sup>

#### Security

Despite the introduction of Wi-Fi security standards, many experts are still concerned over the threat posed by the explosive growth of local area and wide area wireless networks. The process of developing secure wireless networks is similar to the process of securing Internet transactions, but according to an executive research report by the Yankee Group, wireless security solutions must consider bandwidth and memory limitations, battery life, and different network configurations, which aren't inherent to the Internet. Most wireless applications are embedded with wireless application protocol or public-key infrastructure technology, which authenticates

<sup>&</sup>lt;sup>112</sup> Silicon.com, "Mobile Spam: Is the Next Plague Upon Us?" June 2003. http://silicon.com/news/165-500001/1/4599.html.



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<sup>&</sup>lt;sup>111</sup> CNN, "DoCoMo Wins Spam-Mail Fight." March 31, 2003. http://edition.cnn.com/2003/BUSINESS/asia/03/25/docomo.reut/.

users. Other means of securing wireless data use passwords or encryption to protect the transfer of information through airwaves.<sup>113</sup>

Wi-Fi security may be of particular concern for corporations in situations in which their frequent business travelers are hooking into Wi-Fi connections at hotels and airports. A common approach for remote corporate users is to use the corporate virtual private network (VPN) to provide a secure connection over Wi-Fi networks. VPNs manage data confidentiality by encrypting network traffic, but they don't always have authentication systems or access controls that work well in wireless environments, especially when the access point may be publicly accessible (like that Starbucks hot spot). If a VPN isn't set up with strong mutual authentication on both ends, users may be open to a "man in the middle" attack, in which a villain on the wireless LAN, monitoring traffic to the access point, intercepts their attempts to connect to the corporation's VPN and manages to masquerade as its VPN server, perhaps just long enough to steal logon credentials.<sup>114</sup> The message here is simple: hoteliers and other suppliers implementing Wi-Fi networks in a travel setting must work with their vendors to ensure the optimal security environment. It is likely that in the near future Wi-Fi security concerns will be voiced by corporate security management departments and, thus, suppliers need to be prepared with detailed answers to these issues so they may alleviate the concerns of their corporate customers.

#### Preparing for the m-Travel Future

At its core, travel is a service industry. If the type of seat (coach vs. first class) or hotel room or the size of a rental vehicle is a factor in supplier choice, wireless services will become an increasingly important decision point for the frequent traveler. Recent surveys have already validated the fact that the availability of broadband Internet connectivity plays a role in hotel selection. The new world of the always-connected mobile traveler is arriving faster than the

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<sup>&</sup>lt;sup>113</sup> Information Week, "Wireless Security Concerns." January 3, 2001. http://www.informationweek.com/story/IWK20010103S0006.

<sup>&</sup>lt;sup>114</sup> Information Week, "Tech Guide: Wi-Fi: Security for the Masses." June 30, 2003. http://www.informationweek.com/story/showArticle.jhtml?articleID=10808186&fb=20030707\_mobile.

industry can adapt. New applications such as LBS will become a key differentiator for the frequent traveler and should be considered enhancements to existing customer service initiatives. We are moving away from the view of mobile technology as the next "cool" thing to an understanding that wireless communication is an essential part of the new travel process. Evidence is building that wireless messaging can deliver a definitive ROI.

Travel e-commerce is the most successful category on the Web. In the mid-1990s many traditional travel players were unprepared for the disruptive impact of the Internet. As a result traditional travel brands gave way to new entities such as Expedia and Travelocity. The next disruptive technology cycle has already begun. Wi-Fi hotspots have been launched at most airports and hotels. Smartphone adoption is coming quickly. Despite the industry malaise, travel suppliers and intermediaries must start today in developing the next-generation mobile travel applications that will enhance the travel experience. Travel marketing professionals need to team with their IT departments to evaluate all services in a wireless context or risk being left behind as the next technology wave approaches.



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## **Sponsor Information**

Travel Tech Consulting is grateful to our sponsor who helped fund this project:



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