A TAXONOMY FOR ASSESSING FITNESS
OF MOBILE DATA SERVICES
IN US CONSUMER MARKETS

By

Michael Trupiano

Submitted to the Department of Electrical Engineering and Computer Science

In Partial Fulfillment of the Requirements for the Degree of

Master of Engineering in Electrical Engineering and Computer Science

At the Massachusetts Institute of Technology

01 February 2001

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ABSTRACT

The market for mobile access devices is exploding as measured by conventional consumer electronics adoption standards. At rates outpacing consumer adoption of telephones, televisions, VCRs, and personal computers, mobile access devices are headed on the path of ubiquity in our culture over the next several years.

A survey of the wireless market today shows that mobile access devices have certain characteristics, which allow for the creation of value-added services to the consumer. These characteristics include location-awareness, personalization, and immediacy. An examination of revenue models of information goods (as found on the World Wide Web over the last several years) reveals historically useful information that can help shape a taxonomy for assessing fitness of mobile data services in U.S. consumer markets. The ability to build an install base, to provide value-added (non-commoditized) products and services, and to manage the customer will be vital to the success of mobile data services firms.

A framework originally described by Shapiro and Varian is employed as a measuring stick. A new framework and concomitant rubric are developed which measure a relative degree of opportunity and profitability for firms considering a foray into mobile data services. Mobile data service candidate companies are then measured against this rubric.

Thesis Supervisor: Dr. Amar Gupta
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Cambridge, Massachusetts
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1 INTRODUCTION

In the late 1990’s, much attention was paid to technologies such as wireless personal digital assistants (PDAs), global positioning system (GPS) in automobiles, and the boom in mobile telephone handsets. Prior to the technology stock fizzle in mid-1999, tech analysts were frequently projecting near-unbridled growth in several of these high-tech sectors. The stock fizzle notwithstanding, the consumer adoption rate of some of these technologies is still far outpacing that of previous generations’ consumer electronics.

Perhaps the largest hurdle for companies hoping to break into or succeed in today’s high-tech sectors is fixing on the appropriate strategies for pricing and revenue. While the topic of this study is decidedly revenue and pricing models, the context is unmistakably mobile data services. Identified as more than simply an ephemeral fad [17], mobile data applications find opportunity at nearly every turn. Examples are as diverse as the type of people who will use them; among those already market-tested are gateways to wireless Internet access, mobile online trading services, and short text messaging. Research trends indicate that access to mobile data services is occurring most frequently on mobile phones, following by PDAs [18]. The same report highlights analyst projections, which estimate that low-end smart phones will be the access devices of choice over the next several years. As such, the study will bias its focus toward service providers who aim to capture a significant fraction of these users.
Mobile phones and handheld digital assistants, in particular, are pervasive in cultures around the world—ranging from the United States to Japan and Southeast Asia to Scandinavia. For a number of reasons—some technical, some social, some political—adoption dynamics have varied widely over these geographies [28]. As such, the study that follows will select one of these geographies—the familiar United States—and will explore the technical, social, and economic challenges presented in this geography. Additionally, mobile data services clearly have applications in both commercial and consumer sectors. As different business units commonly handle these two sectors, a focused study will choose one—the consumer sector—for in-depth analysis.

The subsequent chapters in this study will examine more closely several of the issues central to the success of a mobile data services operations.

- Chapter 2 (The State of the Industry) will delve deeper into the market segmentation issues addressed above, as well as explore the infrastructure supporting mobile data services. The key takeaway is that the existing infrastructure is advanced enough to build semi-robust applications for the types of access devices consumers will be using over the next several years.
Chapter 3 (What Makes Mobile Unique) identifies the "mobile sweet spot," or the intersection of location-awareness, personalization, and timeliness. Each of these three elements demonstrates value-added to the wireless consumer. Taken together, they create a compelling value proposition and a useful framework for wireless functionality analysis.

Chapter 4 (Mobile Revenue Models) focuses on generic information pricing models and, specifically, mobile revenue models. Strategies for pricing are accompanied by several examples. A history lesson is gleaned from companies' business experiences on the World Wide Web (WWW), and a series of recommendations for pricing and revenue models is laid out.

Chapter 5 (Case Studies) begins with a survey of mobile service offerings, follows with a qualitative rubric for evaluating mobile data service candidates, and concludes with two business cases as applied to this rubric.

While admittedly not a survey of the complete mobile landscape, this sector-slice (i.e. U.S. consumer markets) is both personally relevant and a well-defined business challenge. It is the hope of the author that this study will make a strong case for mobile pricing and revenue model strategies in United States consumer markets.
2 THE STATE OF THE INDUSTRY

This study focuses primarily on mobile data services revenue models. More exactly, it examines data services as an information good or as a service. The economics (e.g. market segmentation, market sizing, etc) of the infrastructure and consumer hardware will be discussed, but these economics will not be the focus of this research. As such, distinctions will be made over the course of this analysis between mobile data service revenue and “supporting role” revenue.

At the conclusion of this chapter, the reader will better understand:

- **Delivery mechanisms will be assumed in the short run.** At present, significantly more demand exists for low-bandwidth data services. The infrastructure will not pose a threat to the delivery of these types of services.

- **The mobile phone is the platform of choice.** While other choices, such as the PDA, exist, most market analyses project that mobile phones will be the clear winner over the next five years. As such, companies looking to profit from data services should target this largest, most cost insensitive portion of the market.

- **The United States is the geography of choice.** While the US is not the leader is wireless deployment or applications, it provides an interesting and familiar context for this study. Adoption rates of mobile data services in the US will be affected by existing characteristics such as market structure of competitive goods and services and general economic welfare.
Several of these related areas will be referenced; this chapter will provide the necessary introductions to them. Chief among these related topics are the existing and future delivery mechanisms (the infrastructure), the consumer hardware devices (mobile phones and PDAs), and geographies of the markets.

2.1 The Wireless Infrastructure

The wireless infrastructure, and its concomitant history, provides an important perspective for understanding the products and services that will excite United States consumer markets. As the infrastructure must be capable of meeting the demands of the services, some limitations will be found simply by examining characteristics of the network. This theme will be repeated in Section 2.2, where some limitations are imposed by the handsets accessing the network. This section will take a brief high-level look at the several “generations” of wireless networks. The take-away is that mobile data service providers should focus research and development efforts on the capabilities of today’s 2.5G networks.

Table 2A: Summary of the Generations of Wireless Networks

<table>
<thead>
<tr>
<th>Characteristics of Each Generation of Wireless Network</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1G</strong></td>
</tr>
<tr>
<td>Designed for voice</td>
</tr>
<tr>
<td>Capable of very little data</td>
</tr>
<tr>
<td>Low bandwidth</td>
</tr>
<tr>
<td>Analog processed data</td>
</tr>
<tr>
<td>Large Coverage</td>
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<tr>
<td>Roaming in the United States</td>
</tr>
</tbody>
</table>

Source: Original
**First-generation (1G) wireless networks** worked in conjunction with analog-based cellular phones. The information transmitted is processed in a purely analog fashion; encoding and compression are not major players. The networks were historically limited with relatively small bandwidth, but managed wide coverage and penetration.

**Second-generation (2G) wireless networks** were designed to transmit data. While voice was still the primary “data” to be transmitted, it was encoded and compressed to make more efficient use of the still-small bandwidth (i.e. up to 9.6 kbps). More data support was added to 2G networks. Additionally, capabilities for international roaming were added to some 2G networks.

**Third-generation (3G) wireless networks** aim to meet several objectives that have been gafted in prior wireless networks. Included in these objectives are network universality (works everywhere), high bandwidth (up to 2 Mbps fixed), flexibility (accommodates various access demands), high quality of service (comparable to a fixed network), and service richness (support for simultaneous connections, video, integrated services, etc.) 3G networks are springing up in Japan and Scandinavia where cutting-edge technologies are being tested. While certainly flashy, consumer demand is not yet clear for 3G networks in the United States [17].
Most of today's networks wireless networks, especially in the United States, are still a significant way off from 3G. It would, however, be unfair to classify the networks as 2G, either. Instead, today's U.S. networks fall into the category of 2.5G. 2.5G networks are characterized as voice-dominated, enhanced data networks capable of transmitting e-mail and accessing the Internet. Built on a 2G backbone with 3G ambitions, 2.5G networks are higher bandwidth and employ additional technologies (e.g. GPRS) not found in traditional 2G networks.

As wireless networks ramp up toward 3G networks—and many IT research analysts predict they will be deployed within three to five years—service providers might be tempted to target the cutting edge data services these networks can support [26]. This will be a mistake. In United States consumer markets, the overwhelming majority of users do not have (and will not have) devices to take full advantage of 3G networks once they are deployed. As outlined in the next section, the expected mass adoption of handsets will occur in the low-end smart phone sector, which maps most closely with existing 2.5G networks. The rate of change of network status (from 2.5G to 3G) is almost entirely unimportant if the access devices do not keep pace. As such, mobile data service providers should consider a range of services that will work on today's networks, and will continue to work (or, perhaps, work even better) on incrementally improved networks.
2.2 Handheld Devices: Mobile Phones and PDAs

For the past few years, much attention has been paid to the adoption rates of mobile phones vis-à-vis adoption rates of personal digital assistants (PDAs). While a more clear distinction used to exist between the two, the line is beginning to blur noticeably. Several PDAs from Palm are now internet-capable (via an add-on modem) or have wireless connectivity built in, as is the case with the Palm VII. Likewise, several mobile phone handsets are pushing the line of maintaining information more traditionally reserved for the PDA; among these features are:

- intelligent phone directories
- schedules
- web browsers
- alarms

The two most identifying characteristics that distinguish the mobile phone from the PDA are form factor and usage pattern.

On form factor, Dulaney [18] writes “Cellular-phone factors should remain stable, with the Nokia 2110 and Motorola StarTAC 8600 representing the extreme boundaries in acceptable form factors.” PDAs, on the other hand, “while still vacillating between being a notebook replacement and an organizer, should become more organizer focused for form factors that are either belt-mountable or coat pocket size.” Regarding usage,
Dulaney continues, “Smart phones will become voice-first, data-second devices. Interactive PDAs will become data-first, voice-second devices.” Limited largely by ergonomic constraints, spatial arrangement and methods of input will be built to suit these respective needs.

Which, then, is it? Should service providers develop applications to deliver data and services to multiple platforms, or can they hedge their bets and maximize their investments by targeting just one? Laszlo takes a hard stance on the issues. His research firm, Jupiter Communications, projects that “the vast majority of handsets will fall into the category of low-end smart phones.” Moreover, by 2003, he projects that “the US market for mobile devices will 75.9 million low-end smart phones, compared with only 15.5 high-end smart phones and PDAs.” Admitting that bandwidth considerations will

Figure 2.1: Projected US Mobile Device Penetration, 2003

![Bar chart showing projected US mobile device penetration, 2003. The chart indicates that low-end smartphones will account for 75.9 million devices, while high-end smartphones and PDAs will account for 15.5 million devices.]

Source: Jupiter Communications
improve over time, he continues “but they will retain many of the interface and display limitations that plague today’s web-enabled handsets.”

Jones [15] unequivocally states, “At some point between 2003 and 2005, we expect the number of mobile phones deployed worldwide to exceed 1 billion. Consumers will have more phones than PCs and will spend more time near a phone than a PC. The phone will be the dominant client device for consumers or mobile workers.” The same research continues to describe that this massive number of phones will include multiple generations of technologies worldwide, from the most primitive to the most cutting-edge. Mobile data services may run the gamut, but those those will become most profitable will target the largest possible segment of this group. Further research by GartnerGroup indicates the following trends:

- digital phone technologies are expected to have replaced analog phone in developed countries by 2003
- the highest data rates and newest technologies are likely to be rolled out in urban areas with high populations

Clearly, a trend is beginning to emerge. While the previous data were on a worldwide basis, the projections are in line with the others. A mobile data service provider would be foolish not to focus on the lion share of this emerging market—digital phones, low-to-medium bandwidth, urban locales.
2.3 A Focus on the United States

The United States is both a familiar backdrop and an interesting case study in wireless access device adoption. Adoption rates in the United States have not been nearly as eye-popping as adoption rates in Europe or Southeast Asia [26]. Several reasons exist which may explain this phenomenon. This section will begin by examining these reasons. It will continue by further segmenting the US market to help target mobile data service initiatives.

The wireline infrastructure in both Europe and Southeast Asia is very poor compared to the wireline infrastructure in the US. Quality of service is much lower, and availability of service is non-existent in some locations. Wireless connectivity, then, provides a much cheaper means to achieve the same end as a high-quality wireline telephone system. Moreover, users in Europe have been conditioned to pay for telephone service differently that user in the US. In Europe, "local service" is metered. The cost structure for wireless service mirrors the cost structure for wireline service in Europe, so no leap of faith is required for the switch. In the US, users are conditioned on a flat fee local service. Using a mobile phone to place a call to a neighbor, then, is a fiscally irresponsible decision. When viewed together, these two obstacles pose a significant hurdle for US mobile service providers.
Brooks [19] asserts that “Contrary to the current industry focus on the mobile professional, the largest opportunity associated with access outside of the home lies in tapping into the mass market. **Between now and the end of 2005, over 27 million US households will come online**; many will first use the Internet in an access point outside the home, presenting a key acquisition opportunity for Web ventures.”

In 1999, a mere five percent of all of US households were accessing the Internet with non-PC devices [20]. These numbers are expected to grow dramatically, as seen in Figure 2.2 below. This corroborates an earlier statement that a tremendous opportunity exists with a new customer base.

---

**Figure 2.2: Access Device Distribution of US Online Households, 1999 and 2005**

![Access Device Distribution Chart]

Source: Jupiter Communications
Relevant to targeting the appropriate user groups, Brooks has also identified the following trends in growth of online users in the US market:

- Households with incomes below $50,000 represent the lion’s share (over 75 percent) of future new online users.
- Low-income households are more likely to prefer access in currently under-targeted public areas, including post offices, supermarkets, malls, stores, and stadiums.

Contrary, perhaps, to intuitive assumptions, it will be prudent for mobile data service providers to consider heavily the opportunity that lies in lower-to-mid income households. As many of these households are less likely to purchase PCs which cost several thousand dollars, handheld devices may strike big in this sector. Regardless of which income group or groups are eventually targeted, mobile data service providers must be aware of the millions upon millions of new US households expected to jump on the Internet and wireless bandwagon over the next several years.

In the preceding sections, a case has been built for examining mobile pricing and revenue models in a specific geography (i.e. the United States) to a specific customer segment (i.e. consumer’s wielding low-end smart phones.) A case remains to be built for the practicality of mobile applications. This will be the subject of Chapter 3, “What Makes Mobile Unique.”
3 WHAT MAKES MOBILE UNIQUE

While it is clear that interest in mobile devices and mobile commerce has spiked since late 1999, it remains unclear how to target the wireless audience comprised of millions of potential consumers. Firms ranging from old standbys (e.g. IBM, Oracle) to newer interactive agencies (e.g. Razorfish, ZEFER) are rapidly announcing and launching initiatives in mobile data access [21] [22] [23] [24].

The foray into the wireless space is reminiscent of the World Wide Web’s 1995 explosion. Web sites and applications were designed quickly and often haphazardly as the WWW audience grew. Early “killer apps” of web turned out to be portals (e.g. Yahoo) and low-cost commerce (e.g. Amazon), while many other early web fads faded quietly away. Developers and service providers alike should learn a lesson from the web’s boom and capitalize on those characteristics of mobile commerce which make it unique. A sizable consumer base will be reached by providing services available on today’s 2.5G networks that hit the mobile “sweet spot.” (See: 4.1 Reaching a Critical Mass.)

In this chapter, the sweet spot is identified as the intersection of location-awareness, personalization, and timeliness. First, each of these three components is broken down to its elementary parts for examination. The sweet spot will then be examined as a whole, and a framework will begin to appear. Revenue models discussed
in Chapter 4 will later be incorporated and a rubric created in order to analyze
opportunities in the U.S. consumer markets of mobile data services. The same sweet spot
will likely be the source of early mobile commerce revenues while bandwidth and form
factors are enhanced in the background.

3.1 Location-Awareness

"Location is the one thing that we have that no one else has on the Internet."

Stephen Doyle
Head of GPRS Solutions and
Realizations at Motorola, Inc.

The ability of a device to know exactly where it is, within a few meters of
precision, opens up a world of opportunity for mobile service providers. Applications as
simple as “help me find the nearest gas station” or “I’m lost! Get me home!” are trivial
when a device knows its location and can hook into a powerful engine like MapQuest.

Location information, while not unique to mobile access devices, is especially
useful when the device moves with the consumer. Significant progress has been made in
mobile location determination as a result of the US Government’s E-911 mandate, which
charged that 67% of all cell phone calls must be traceable within 410 feet by October
2001 [10]. E-911, however, is simply a bellwether of location-aware applications. While
E-911 will serve a decidedly noble and civic-minded function, the infrastructure will
enable myriad consumer-oriented applications that, if properly thought out and
implemented, may yield significant revenue to service providers and those companies building and maintaining the mobile infrastructure.

The remaining subsections will detail the E-911 initiative, explore several location determination techniques, consider enhanced location-based services beyond E-911, and introduce the privacy question when location information is available.

3.1.1 E-911

Wireline 9-1-1 calls have historically been easy to locate as the telephone number is physically tied to a street address. The Public Safety Answering Point (PSAP) database is used as a lookup table, and routes the 9-1-1 call to the nearest PSAP dispatch (i.e. 9-1-1 operator) along with relevant address information. As a result, the dispatch is able to immediately proceed to the more urgent details of the 9-1-1 call.

In June 1996, the Federal Communications Commission first proposed a mandate for enhanced 911 (E-911), which would provide a similar service for wireless 9-1-1 calls. At the that time, wireless 9-1-1 calls were routed to a PSAP, which at times returned useless or null data and was unable to further route the call to the nearest 9-1-1 dispatch. A full implementation of E-911 will involve a more complicated flow. The mobile service provider will act as a third arbiter of location information, thereby protecting privacy of the user while adding a level of complexity to the emergency call flow.
3.1.2 Location Determination Techniques

Perhaps the most exciting by-product of E-911 is that mobile service providers have begun to investigate several implementations of location determination. Both network-based and handset-based location determination techniques have been developed, and each has its respective advantages and disadvantages.

Network-Based Location Determination Techniques

The most commonly used technologies by network-based location providers are angle of arrival, time difference of arrival, and multipath fingering.

As its name implies, Angle of Arrival (AOA) is a technology that is used to locate a caller based on the signal’s arrival angle at the base station. AOA uses a special array of four to twelve antenna to determine the direction of the incoming signal. This technique requires two base stations with special antennae in order to accurately determine a caller’s location. AOA is prone to error when a caller is far from base stations; in such a case, the error may multiply the further the caller is from the base stations. While it is possible to build “smart antennae” which can limit this error, the fact remains that special antennae are required to build an AOA-based location technology.

Time Difference of Arrival (TDOA) is a technology that is used to locate a caller based on the time differences of the arrival of the signal at different base stations. A latitude/longitude coordinate is yielded by triangulating time differences from at least
three base stations. The time difference is measured down to the nanosecond, thus
requiring that base stations must be precisely synchronized. One drawback of TDOA is
that, in rural areas especially, three base stations are not close enough to determine
location accurately and that, in urban areas, a signal can be disrupted by buildings or
terrain. TDOA carries with it a surprisingly high cost due to the requirement of base
station synchronization. Despite its drawbacks, TDOA is one of the more commonly
used techniques of location determination in use today; it is found commonly in both
military applications and airport radar systems [11].

Multipath Fingering (MF) is a technology used to locate a caller based on the
radio waves that the wireless phone emits. Waves reflect off surroundings and make a
specific fingerprint, depending on where they originate. These fingerprints can be
matched to those in a database to identify the phone’s location. One major advantage of
MF is that only one base station is needed to find a caller; however, if the fingerprint is
one that is not matched in the database, the location is only estimated at best.

Handset-Based Location Determination Techniques

Handset-based solutions have a distinct advantage over network-based solutions
in terms of privacy. Instead of the network “knowing” where a handset is at all times, the
consumer controls the flow of information about his or her location—it is only “known”
when the consumer requests it be known. Handset-based solutions, which usually use the
Global Positioning System (GPS) to pinpoint a caller’s location, require fitting every
phone with either a chip or a GPS receiver. Because each handset would need this technology, subscribers’ existing handsets would have to be replaced. GPS-enabled handsets communicate with a series of satellites orbiting the Earth. The handset would then provide location information on a latitude, a longitude, and an altitude basis in addition to the exact time of day.

The most significant drawback of a GPS-based solution is that the location is found only when a call is initiated. While this is satisfactory for E-911 services, it fails to provide continuous tracking—a key element of some location-based enhanced services.

**Pros and Cons of Handset- and Network-Based Location Determination Techniques**

In the following table, the pros and cons of handset- and network-based location determination techniques are compared. Key features are further highlighted and discussed below.

<table>
<thead>
<tr>
<th></th>
<th>Pro</th>
<th>Con</th>
</tr>
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<tbody>
<tr>
<td><strong>Handset-Based</strong></td>
<td>- Privacy is not an issue</td>
<td>- Continuous tracking not available</td>
</tr>
<tr>
<td><strong>Solution</strong></td>
<td>- Requires little networking equipment</td>
<td>- Must replace 67% of current handset</td>
</tr>
<tr>
<td></td>
<td></td>
<td>base</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Not useful for network planning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- May not work where signal is not</td>
</tr>
<tr>
<td></td>
<td></td>
<td>strong enough (foliage, buildings, etc.)</td>
</tr>
<tr>
<td><strong>Network</strong></td>
<td>- Can be used for network planning</td>
<td>- Lack of privacy</td>
</tr>
<tr>
<td><strong>Based-</strong></td>
<td>- Covers all subscribers simultaneously</td>
<td>- May not work in some settings such as</td>
</tr>
<tr>
<td><strong>Solution</strong></td>
<td>- Continuous tracking for navigation</td>
<td>in rural areas where there are not</td>
</tr>
<tr>
<td></td>
<td>applications</td>
<td>enough base stations to locate callers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- May require carriers to build out new</td>
</tr>
<tr>
<td></td>
<td></td>
<td>areas more quickly, sometimes in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>areas where maximum capacity has not</td>
</tr>
<tr>
<td></td>
<td></td>
<td>been reached</td>
</tr>
</tbody>
</table>

Source: IDC/LINK, 1998
Although a network-based solution will likely require carriers to build out new areas (and even modify or build new base stations), this cost structure is preferred to one in which the existing consumer base must replace its mobile access devices to the tune of 67%. This rapidly growing market will suffer if those corporations building the infrastructure are unwilling to adapt in order to increase, not freeze, adoption rates. Additionally, the opportunity to use this same data for future network planning will encourage faster, more targeted build outs of future networks. By tracking calls and finding areas where calls are most often dropped, carriers can better evaluate their networks and improve coverage in a systematic fashion.

The primary drawback of the network-based solution is that an apparent lack of privacy exists. A user may feel that he or she is being tracked, not supported. This very issue is addressed in a later section. Suffice it to say, significant opportunity exists to protect consumer privacy while providing worthwhile location based services. This issue is addressed in Section 3.1.4, *A Matter of Privacy: Location Tracking v. Location Support*. At the same time, continuous tracking can obviously provide for much richer information and a much richer mobile experience. The handset-based solution only “shares” a user’s location information at the time a call is initiated.
3.1.3 Enhanced Location-Based Services Beyond E-911

Although the FCC mandate does not take effect until October 2001, several service providers have made significant headway in building the infrastructure necessary to support E-911 and other location-enhanced services [11]. These “other” location-enhanced services are limited only by the boundaries of imagination, and comprise the first of the three targets of the mobile commerce sweet spot: LOCATION. Location, the ability to easily change location, and the ability to track changing location opens a world of possibilities. Research firms, as early as mid-1998, had determined demand for location-based applications such as directories, directions to restaurants and hotels, and local weather reports. Later research specified demand for such services as local news headlines, location-based billing, traffic information services, and mobile yellow pages [10].

After implementing location-finding technology to comply with the FCC mandate, carriers will be left with an excellent opportunity to differentiate from one another and to generate additional revenue. At the simplest level, carriers could sell localized information at two different levels: general area (e.g. metro-Boston) and specific location (e.g. Newbury Street and Massachusetts Avenue). Types of service, as well as revenue models, vary widely both across and within the two levels.

Some examples of general area and specific location applications are included in the Table 3B.
Table 3B: Examples of General Area and Specific Location Mobile Applications

| General Area Applications | - Local headlines and news  
|                          | - Local weather reports  
|                          | - Local events calendar  
|                          | - Metropolitan Traffic Report  
| Specific Location Applications | - Driving directions / navigation assistance  
|                                | - Customized Traffic Information Services  
|                                | - Ordering delivery of food / goods  
|                                | - Comparison shopping from inside a store  

Source: Original

3.1.4 A Matter of Privacy: Location-Tracking v. Location Support

Privacy is increasingly important in an era where seeming every move one makes is visible and is often recorded. Analysis of click streams used for targeted marketing is considered to be pushing the envelope by many. As such, the issue of location tracking vs. location support is briefly discussed.

While location tracking may be valuable for package delivery or paroled prisoners, most consumers find the prospect of location tracking a significant deterrent to jumping on the mobile data bandwagon. In fact, a recent IDC report demonstrates the concerns of several college students and adult consumers [25]:

- “That’s scary. I don’t like the phone knowing where I am. It can be dangerous.”
- “Why would it be important for people to know where the phone is? Would I want that?”

Clearly, if location-based technologies are going to take off on a large scale in consumer markets, the vendors of the technologies will have to educate users and potential users of
both the safety and the benefits of location-enhanced services. It is a consensus that consumers do not want to be tracked via their telephones.

3.2 A Finer Degree of Personalization

"What is clear is that personalization serves a segment of very heavy web users."

Barry Parr
Analyst, International Data Corporation
Why Personalized Content Matters

Personalization, though not unique to mobile devices, can greatly enhance services available on mobile data devices. Social trends indicate that a mobile phone usually belongs to an individual, a generalization that cannot be made about the personal computer. As such, several models could be applied to mobile data personalization that can, while requiring minimal bandwidth, allow for a high degree of personalization. This section will begin with an analysis of existing web personalization models, examine the differences between WWW identity and mobile identity, then will suggest a few models for transitioning this personalization over to mobile devices.

3.2.1 Personalization on the World Wide Web

Personalization is available in many forms on today’s Internet. This section will review the brief history of Internet personalization and distinguish personalization as an important feature in future applications.
Personalization began as a feature offered by portals, and portals are still among the most-used personalized sites. Yahoo!, for example, which is the start page for millions of web surfers, allows a user to select which content he or she would like to see at start up [2]. Thirteen categories—from Essentials to Business & Finance to Technology to Sports—contain nearly 70 modules of a finer grain (e.g. in the Business & Finance category, modules include Company News, Currency Converter, Small Business Tip, and others). In addition, Yahoo! allows the user to personalize the page layout. A user can choose to display content in two or three columns, specific content at the top or bottom of the page, etc. This type of personalization is most common on portal-type sites. It is characterized by direct inputs from a user questionnaire and direct output chosen by the publisher.

A 1998 study by RelevantKnowledge and IDC revealed that users who personalize their Yahoo! site visit it nearly three times as often as “regular” users. Corroborating this, more data suggests that Excite (another portal / search engine) personalizers visit Excite nearly four times as often as “regular” users.

<table>
<thead>
<tr>
<th>Table 3C: Personalizers Visit the Web More</th>
</tr>
</thead>
<tbody>
<tr>
<td>Users (Days per Month)</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>Yahoo!</td>
</tr>
<tr>
<td>Excite</td>
</tr>
</tbody>
</table>

Source: RelevantKnowledge and IDC, 1998
One important side effect of direct personalization is the introduction of switching costs—the total cost associated with a consumer's move from provider A to provider B. Following is an example of switching costs as they relate to Internet portal selection.

A user will likely select one provider and will, over time, lock himself into that provider. For the purpose of this example, we will assume that the user has chosen the Yahoo! Internet portal. Though product (or service) differentiation is low at the time of initial selection (Yahoo! offers similar services as several competitors out for the same market share), a provider can add complementary services to increase user lock-in, thereby increasing switching costs. In the case of Yahoo!, users may save favorites such as stock tickers, local weather preferences, sports favorites, and even credit card information for bill paying services. The user is provided a richer experience, and may

Figure 3.1: The Lock-in Cycle

Brand Selection

Lock-in

Sampling

Entrenchment

Source: Information Rules
even be paying for it (such as in the case of Yahoo! Bill Pay). In the lock-in cycle, this stage is known as entrenchment. The provider works to make the user rely more and more on the provider's primary commoditized content. At some point in the future, a user may choose to evaluate other service providers. By this point, the user has committed time, energy, and even money into his or her original choice. Switching providers will involve re-logging all of this information in exchange for (hopefully) a better online experience. The user must value the additional services from the new providers more than the time and energy it takes to re-enter the original information. This scenario is unlikely unless the new provider is sufficiently differentiated. While many portals may offer similar services, users are unlikely to invest the time and energy into highly customizing the same information on several sites—the switching costs are just too high. Due to the free nature of the information and its relative commodity status, an undifferentiated competitor will be unable to steal users already invested in a personalized portal.

Personalization in the form of collaborative filtering is also an extremely big business on today's Internet. Collaborative filtering is the practice of using information inferred from other users' experience to deliver a form of customized content to the user. Technically, it is similar to using neural nets to give a user content he is mostly likely to want. A recommendation engine that uses collaborative filtering "learns" each individual's preferences through observing real-time behavior, such as click-throughs; recalling past behavior, such as purchase histories; and asking the individuals to rate a
number of relevant items. The engine then pools this information with knowledge gained from a community of other individuals who share similar tastes and interests. Because the collective preferences of this community are a good predictor for how its members will like items they have not yet tried, the engine draws upon its knowledge base to make recommendations with a relatively strong accuracy level.

Direct customization and collaborative filtering offer the end user a richer experience; they are key drivers of user stickiness as well. Some content—such as advertising—is not the reason most users come to a particular web site; however, advertising is one of the major players in the personalization space. As such, targeted marketing campaigns have been tested in these advertising markets. In many cases, the results are astounding. Neilsen’s NetRatings shows that the average click-through of the average banner ad (both targeted and non-targeted) was a miserable 0.45%. Targeting banner ads, however, can boost this rate by orders of magnitude. The most impressive example is that of a gambling advertisement that, over the month of June 2000, boasted a click-through rate of 83.36%. Over the period of the month, just over a quarter of a million unique users saw these ads, which no doubt were well-placed—probably at other gambling sites where users would be most likely to click through. Gambling ads, WebMD ads (likely posted from within the WebMD site), and adult content ads (also likely found on other adult content sites) systematically outperform the averages when it comes to click through rates. Why? They are very appropriately targeting their respective audiences. The WebMD ads were clicked through at a rate of more than 35%.
It is common for gambling ads to have click-through rates of 20% - 40%. Ads for adult content also ran the gamut; the best among them garnering a 37.81% click-through rate. Not surprisingly, the reach (i.e. the percentage of online audience who saw an ad) for the most clicked-through ads was very small. As demonstrated in Figure 3.2, the most clicked-through ad had a reach of 0.32% (or 267,820 pairs of eyeballs), less than three-quarters of the average banner ad.

**Figure 3.2: Top Five Banner Advertisements by Click Through Rate, June 2000**

<table>
<thead>
<tr>
<th>Impressions</th>
<th>Rank</th>
<th>Click Rate</th>
<th>Unique Audience</th>
<th>Reach %</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,531,879</td>
<td>45</td>
<td>83.36</td>
<td>366,798</td>
<td>.44</td>
<td>7565</td>
</tr>
<tr>
<td>1,139,271</td>
<td>5206</td>
<td>44.27</td>
<td>267,820</td>
<td>.32</td>
<td>267820</td>
</tr>
<tr>
<td>120,456</td>
<td>21110</td>
<td>41.38</td>
<td>88,494</td>
<td>.11</td>
<td>20055</td>
</tr>
<tr>
<td>198,303</td>
<td>18,477</td>
<td>38.84</td>
<td>104,770</td>
<td>.12</td>
<td>19269</td>
</tr>
<tr>
<td>289,284</td>
<td>15253</td>
<td>38.65</td>
<td>136,409</td>
<td>.16</td>
<td>14751</td>
</tr>
</tbody>
</table>

Source: Nielsen/NetRatings, June 2000

The numbers of targeted advertising contrast sharply with ads targeting the "general internet public". Of the 20 most commonly served ads on the Internet in June 2000 (comprising nearly 4.2 billion ad impressions), not a single ad achieved higher than 0.37% click through—a mark reach was reached by a small Barnes & Noble button ad. Not surprisingly, an adult content site achieved the next most successful click-through
rate at 0.33%. Even among the most frequently seen Internet ads, targeted advertising seems to win out.

Personalization on the World Wide Web has been established as the way to attract and retain a user base as well as the preferred route for Internet advertisers. Indications from top research firms confirm that this trend is bound to continue in the future. Tomorrow’s challenges lie in determining how to best leverage this knowledge to remain competitive in the ever-changing Internet landscape.

3.2.2 WWW Personalization vs. Mobile Personalization

Much more than the obvious form factor and connection speed distinguish the mobile Internet-access device from the Internet conventionally accessed via the World Wide Web. Moreover, how marketers and business strategists will address personalization in this new medium will also differ considerably. Some of the lessons learned in WWW personalization will translate smoothly into the mobile world, while others will not translate at all. This section begins by detailing the key differences of WWW and mobile access. The section continues by recommendations for mobile personalization.
How Traditional Internet Access and Mobile Internet Access Differ

Physically, the mobile phone and desktop computer hardly resemble each other. The desktop computer is often loaded with rich color (millions and millions of colors), high resolution (often 1024x768 pixels per screen), and broadband connections to the Internet. Even the slower connections (56k dialup) out-perform the best data rates on today’s mobile telephone networks. Mobile phones are also handicapped with only four to eleven lines of text, monochrome displays, and extremely limited input devices (i.e. the awkward keypad). Input devices on desktops include full-size keyboards and mice, as well as several other less commonly used options. From the outset, it may appear as if these two devices may have nothing in common. Perhaps this is the first of many indicators that mobile access to the Internet should not aim to duplicate traditional Internet access, but rather to complement it.

The most significant difference between traditional Internet access and mobile Internet access is found when usage patterns are examined. Traditional Internet access is used by nearly everyone with means for all sorts of applications, ranging from commerce to news to communities to file-swapping. The primary mode of navigation via a desktop computer is browsing. Users can see screenfuls of information linked to other screenfuls of information and can use rich input devices to easily navigate from one page to the next. High bandwidth permits low attention spans and rapid surfing from page to page. This type of access is not available on today’s handheld computers and telephones. The most immediate hurdle is bandwidth, but even speeds promoted by the proposed 3G
networks will not solve some of the mobile Internet’s problems. Chief among these problems is the form factor. While it is true that screens will get larger, resolution and color depth will improve, and voiceXML may provide one solution to the awkward input problem, screens will remain too small (as dictated by the side of the device) and access too infrequent to accommodate a duplication of the existing Internet. Today’s most advanced “smart” phones continue to have the same problems of awkward input, (relatively) small screens, poor color depth, and limited bandwidth. Two of the most advanced phones, the Nokia 9110 Communicator and the Qualcomm pdQ Smart phone, are shown in Figure 3.3(a, b). Nokia’s vision of the future of smart phones is also shown in Figure 3.3(c). While impressively incorporating many PDA features as well as

Figure 3.3: Production and Concept Smartphones

(a) Nokia 9110 Communicator [above left]  
(b) Qualcomm pdQ Smart phone [above]  
(c) Nokia’s vision of the future of smart phones [left]

Source: Vendor websites
Internet browsing, projections from research firms estimate that fewer than twenty percent of the projected 150 million cell phones in use will be high-end smart phones by 2004 [26].

These numbers, coupled with early adoption rates of mobile data services, should lead mobile service providers to target low-end smart phones (projected to cover nearly 70% of the mobile data-enabled phone market by 2004). The challenge lies in building personalization services for today’s mobile Internet that will be robust enough to see through the phase of smart phone adoption.

**How to Adapt Personalization to Mobile Internet Access Devices**

By and large, user information captured from desktop users will likely be richer than user information captured from mobile users. The limited input device is the obvious hurdle in this situation. While certain technologies such as P3P or CC/PP may work to facilitate the transfer of standard information in a standard format, input is expected to remain more awkward on palm-sized devices.

Smart vendors or service providers will look to marry the capabilities of traditional Internet offerings and mobile offerings, thereby giving a user a single login/password combination and a consistently branded experience. Stronger existing online brands can more easily leverage their consumer base to offer enhanced services without the financial burden involved with “switching” customers.
Additionally, a lesson can be learned from AOL. Wireless carriers have a distinct advantage (as AOL did as an enhanced ISP) of retaining privileged information about its customer base. Namely, AOL retained billing information, which included ZIP code information. ZIP code information is extremely valuable to online marketers insomuch as allows marketers to deduce customer demographics and to target them accordingly.

Once service providers identify mobile data users, many of the same types of algorithms (e.g. collaborative filtering, etc.) can be used to send appropriate content. Specific opportunities for enhanced personalization services on the mobile phone are explored in the following section.

3.2.3 Enhanced Personalization Via the Mobile Phone

Technology research firms have hailed convenience as the hallmark of mobile application success [19]. Specifically, wireless consumers have been pegged to be willing to pay for three things: necessity, convenience, and entertainment. Personalization, in the wireless world, is the road to this aforementioned convenience. Conventional web wisdom is that 50 percent of an audience drops off with each additional click [26]. If this turns out to apply in the mobile world as well (and it may actually be a sharper drop-off), mobile service providers must find a way to provide the quickest, most convenient access to the information consumers most desire. Re-entering
ANY information will not do. Cumbersome registration processes will not do. Users may be required to use complementary web-based registration and profile management in order to have a pleasant mobile Internet experience (and pleasant return trips).

The aforementioned drawbacks of mobile personalization are not to be taken lightly; indeed, personalization will be paramount in generating and retaining interest in mobile data services. Mobile service providers are beginning to understand that to avoid losing wireless users, online ventures must develop new offerings that fulfill user needs and are designed specifically for wireless devices. A key to the types of applications that will take off are that they will be user-centric. The most promising forward-looking applications involve “portal-izing” the mobile Internet experience. As navigation is difficult at best, a user is most likely to remain connected to a service that caters exactly to his needs (e.g. his stock quotes, his business news, his calendar, etc.). Additionally, with push technologies and the voice capability of the mobile phone, many possibilities exist. Figure 3.4 demonstrates Jupiter Communication’s vision of personalized data services delivered to a mobile device. It includes the consumer’s schedule synchronized with data service such as movie and theatre databases, traffic services, weather services, and more.
Figure 3.4: Sample of Personalized Data Delivered via a Mobile Device

<table>
<thead>
<tr>
<th>Standard PIM Calendar</th>
<th>Advanced Push Assistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00</td>
<td>12:00</td>
</tr>
<tr>
<td>9:00</td>
<td>There’s an accident on Rt. 101, take Rt. 280.</td>
</tr>
<tr>
<td>10:00</td>
<td>3:45 Would you like to tell your tennis partner that you’re running late?</td>
</tr>
<tr>
<td>11:00</td>
<td>1 = Yes, 2 = No</td>
</tr>
<tr>
<td>12:00</td>
<td>6:00 Gladiator is playing at Cinema 16.</td>
</tr>
<tr>
<td>1:00 Meeting in San Francisco</td>
<td>7:15 Your groceries can be picked up at the Safeway near Cinema 16 after the movie. Would you like to place the order?</td>
</tr>
<tr>
<td>2:00</td>
<td>1 = Yes, 2 = No</td>
</tr>
<tr>
<td>3:00</td>
<td></td>
</tr>
<tr>
<td>4:00 Tennis in Palo Alto</td>
<td></td>
</tr>
<tr>
<td>5:00</td>
<td></td>
</tr>
<tr>
<td>6:00</td>
<td></td>
</tr>
<tr>
<td>7:00 See Gladiator</td>
<td></td>
</tr>
<tr>
<td>8:00</td>
<td></td>
</tr>
<tr>
<td>9:00</td>
<td></td>
</tr>
</tbody>
</table>

Source: Jupiter Communications, June 2000

The inclusion of web-based personal information managers (PIMs) is further increasing the value of personalized content. An example applies to the traveling businessman. A businessman based in Boston may be traveling to San Francisco for a few days. His PIM, knowing this, would direct this mobile device to display weather and traffic forecasts for his current location, not his listed home location.

Worthy of mention is that an inverse relationship exists between privacy and personalization performance. Because control over personal information is an important issue to consumers, providers must not only deploy the best security technology to protect customer privacy, but must also engage in substantial campaigns to secure customer trust. Neither of these tasks is trivial for service providers. Service providers,
though, can count on the fact that many consumers are willing to share their personal information in exchange for tangible benefits such as discounts. In any case, companies must find a way to empower customers with control over privacy, while maximizing the value of personalization as an asset.

3.3 Immediacy

"Wireless applications will not be driven by a single killer application but by an overall killer attitude: 'I can do anything, anywhere, at any time.'"

K. Dulaney, R. Egan, N. Jones
GartnerGroup Analysts
June 2000

A final component that distinguishes mobile data services opportunities from opportunities in traditional Internet services is that of time sensitivity. The mobile data-enabled phone represents tremendous opportunity in capturing a valuable portion of several markets that are concerned about timely information. Regardless of where a consumer happens to be, time sensitive information such as notification of stock aberrations or scheduling reminders can be delivered immediately to the consumer. Applications that alert or inform based on up-to-the-minute information will prove particularly useful and represent a radical shift from the desktop Web.

Previously, only alphanumeric paging services came close to what can be offered immediately by mobile data services. Paging services, though, allowed only for one-way
messaging in relatively short intervals. Typically paging notices were human-driven instead of machine-driven, limiting their scalability greatly. Currently, mobile devices and infrastructure also have many restrictions causing user inconvenience. The basic value equation is therefore that the value of mobility and immediacy must exceed the cost of the inconvenience.

Several relationships should look to exploit the opportunities in immediacy services, as many of these services cannot be automated by competing technologies. In a business-to-business context, vertical news and alerts show promise to take advantage of immediacy. Like automated e-mail updates now sent between businesses, a mobile version could be adapted to deliver immediate news (instead of, for example, weekly updates) with rich content such as embedded contact information for immediate dialing.

In a business-to-employee context, maintenance alerts (e.g. machine failures) and business process status information are likely candidates to employ immediacy services. Business-to-consumer opportunities include alerts such as stock prices (e.g. a consumer receives a voice or text message when a certain stock changes by 10%) and time-sensitive news. Opportunities even seem to exist on a consumer-to-consumer level. Most notably, financial services such as e-cash transfers between personal devices could exploit immediacy.
What is clear is that the immediacy offered by mobile data services will be a large force in how mobile usage is reshaped. What remains unclear is the revenue modeling for such services that will establish the services as sustainable.

3.4 Hitting the Sweet Spot

In the short run, the limitations of the interface combined with the expense of mobile interactivity will make certain application types more interesting to customers. The three characteristics revealed above (location sensitivity, personalization, and time sensitivity) form a clear ideal for mobile data services. Each of these characteristics is already possible to some degree (and continues to improve). More importantly, each of these characteristics:

- Can work with the limited form factor of today’s smart phones,
- Are well-supported on the 2.5G network infrastructure of the day, and
- Will only become more potent when combined as handsets and infrastructure improve.

It is valuable to visualize the three identified characteristics. Figure 4.4 shows that the sweet spot is found at the intersection of immediacy, personalization, and location. Revenue models aside, it is this area that will drive the most consumer demand (and—therefore—adoption) as it represents the ultimate in convenience to the user.
The table that follows offers examples of the types of applications that may fall into various intersections of these characteristics. The lists are neither mutually exclusive nor collectively exhaustive, but provide a good context to measure the revenue models explored in the next chapter. Several of the opportunities identified have already been used as examples. Several other will be used as examples in subsequent chapters. As we will see, some of these applications will prove invaluable to the mobile data user, while others will not generate much interest or much revenue.
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Graphic</th>
<th>Opportunities</th>
</tr>
</thead>
</table>
| Immediacy, Location, and Personalization | ![IMMEDIACY_GRAPH] | Direct marketing and advertising  
Scheduling reminders |
| Immediacy and Location                | ![IMMEDIACY_GRAPH] | Traffic news  
Navigation services  
Local Events Calendar |
| Personalization and Immediacy         | ![PERSONALIZATION_GRAPH] | E-mail, messaging and paging  
News alerts  
Stock fluctuation alerts / Portfolio tracking  
In-store price comparisons |
| Location and Personalization          | ![LOCATION_GRAPH] | Travel services  
"Find me..." services (e.g. coffee shop, taxi, etc.) |

Source: Original
4 MOBILE REVENUE MODELS

4.1 Achieving a Critical Mass

"Despite the surge of interest in mobile interactivity among firms in the wireless and online industries, consumers remain skeptical of the value of data services delivered to mobile devices."

Joe Laszlo
Principal Analyst
Jupiter Communications
Mobile Revenue Models

In order to launch a full mobile data service assault on the population at large, information and service vendors must create a compelling value proposition for potential users. They must begin by targeting the audiences most likely to be the early adopters with services that will "give them what they want". Characteristics as described in Chapter 3 (i.e. personalization, location-awareness, and immediacy) constitute the core type of services information vendors should most consider deploying in the short run. However, the following characteristics have hindered these services:

- they are not yet available on a wide enough level,
- the consumer is not yet educated enough to dive into the technology yet, and
- carriers are not doing enough to improve the situation.
Laszlo [26] reports that 67% of online consumers currently use a mobile device, but a mere 5% of these consumers currently use, or would be interested in using, a mobile interactive service. This low number (5%) should not be surprising given the relatively low number of demonstrated “killers apps” in the mobile data services arena.

What has previously driven the adoption or demand for other high-tech services (such as cellular phones or broadband Internet access) has been a clear value-added to the consumer. In the case of cell phones, business professionals as well as personal users highly value the ability to be in touch from anywhere. Compounded by the network effect (the value of the network increases as the number of people on the network increases), some initial amount of cell phone adoption actually raised demand for cell phones among other consumers. Broadband Internet access is following a similar path. Broadband providers invested heavily to get the infrastructure and early adopters to buy in. Techies and businesses may see the immediate attractiveness of high-speed Internet access, but personal users would initially see little to gain. When the initial base is installed, the value proposition increases. Now, not only will a new consumer have high-speed access to corporate sites, but users can also leverage the large install base to trade files with other residential subscribers.

Both cell phone use and broadband Internet adoption rates followed positive feedback patterns of adoption, which are characterized by a slow launch period, a rapid takeoff period, and a slower saturation period. The positive feedback is catalyzed by the
fact that both cell phone use and broadband Internet access exhibit positive network
externalities. The 10,000th user realizes much more immediate value in joining the
network than the 100th user will immediately realize. Likewise, the 1,000,000th user will
realize even more immediate value. It should be noted, however, that a certain
technology's saturation point may be reached well before 1,000,000 installed units.
Figure 4.1 demonstrates visually the adoption dynamics of a network exhibiting positive
feedback.

Figure 4.1: Adoption Dynamics

Source: Information Rules

Companies building the infrastructure and selling the mobile data services would
do well to compare their market with the two markets mentioned about. At first glance,
mobile data services would seem to exhibit a lower degree of the network effect; does a
neighbor's subscription to real-time stock quotes make access to real-time stock quotes
more appealing to you? Probably not, though mobile data infrastructure and mobile data
services are clearly complementary products. An increased demand for mobile data services will increase demand for more/better mobile infrastructure, which will enable better data services, which will beg for further infrastructure enhancements. Hence, positive feedback should be exhibited in this industry, and those building both the infrastructure and those building the applications should be interested in kicking off consumer adoption.

Laszlo asserts that "US-based mobile data services are likely to be met with disappointing adoption levels until greater effort at consumer education take place." This obvious lack of consumer education early in the game, coupled with a lack of strong applications, has been to blame. At present, the mobile "desktop"—the phone screen—is controlled by access providers. Sprint, Nextel, and AT&T are all fantastic examples. Having signed several partnering deals with content providers such as Yahoo!, MSN, and Amazon.com, these carriers have limited the consumers mobile online experience. Though more and more WAP-enabled phones are being built to support the mobile Internet on their own, most still rely on gateways of the carriers. Carriers must either become much more innovative and committed to kicking off the adoption curve or face increasing criticism for hosting an unpopular service. Recommendations for how carriers and mobile service providers should structure content and fees are included in the final section of this chapter.
4.2 Information Pricing Models

The elucidation of mobile data pricing models will provide the bridge to carry the reader from identification of the mobile sweet spot to specific cases of mobile data services opportunities. As an information good, mobile data services have very low marginal cost of production. These economics dictate that mobile data providers must showcase more than a mere commodity in order to succeed. Keys to succeeding with a commodity product will be explored. Additionally, several price-setting strategies will be discussed.

During these nascent stages of mobile data services, most content is expected to be little more than a commodity. In commodity markets, classic economics dictates that perfect competition will eventually drive price to marginal cost. Information markets suffer from the characteristic that marginal cost is roughly equal to zero. Thus, information commodity markets should be expected to fail. A company without revenue will not remain a company for long.

In commoditized information markets, Shapiro and Varian [16] argue, there are two sustainable structures:

- the dominant firm, and
- the differentiated product.
The dominant firm may or may not produce the "best" product, but—by virtue of its size and economies of scale—it enjoys a cost advantage over smaller rivals. In a differentiated product market several firms produce the same "kind" of information, but with many different varieties. The differentiated product model is the dominant market structure for information goods. Publishing, film, television, and some software markets adhere to this model. A hybrid model is also common; differentiated, but similar products accompany a disparate market share.

Pricing an information product can be a difficult task. How does a business know how much an end user is willing to pay for its information? Moreover, how does a business appropriately set a price to maximize revenue from its information? In the example graphs that follow, this study will examine a fictitious market and the implications of choosing a given price strategy. Revenue can be accurately modeled as the sum of all purchases at the purchase price. If the price for a good is fixed at a relatively low number (and assuming the product behaves like an economic "good"), we can expect to see a high quantity sold and some fraction of the total possible market captured. Likewise, if the price for a good is fixed at a relatively high number, we can expect to see a low quantity sold and some fraction of the total possible market captured. For a fixed price item, revenue will be maximized when fixed price times the quantity sold at that price is highest. Often, this involves setting a medium-level price and selling a medium-level number of the product. All three examples are shown graphically in Figure 4.2.
While clearly the simplest pricing strategy to implement, fixed pricing offers the least flexibility in capturing parts of the market a seller might not traditionally capture.
As described in Section 3.2, personalization of a product can lead to better acceptance rates among the target audience. In an ideal scenario, companies would also work to personalize their pricing. While ideally a seller would like to capture 100% of the
market, this result is difficult to realize. The approach would involve determining each consumer’s personalized price point on a product and pricing on a one-by-one basis. In Section 4.2.1, which follows, examples of this type of pricing strategy are explored.

A middle ground between personalized pricing and fixed pricing exists. These strategies involve selling nearly the same information to different groups of buyers at different prices. Depending on the particular strategy, the groups could be self-selecting (as in 4.2.2 Versioning) or previously chosen (as in 4.2.3 Group Pricing). Demand curves for each of these two multiple price strategies are shown in Figure 4.3.

In the sections that follow, personalized pricing, versioning, and group pricing are each examined in greater detail.

4.2.1 Personalized Pricing

Personalized pricing—as first described in the previous section—is the practice of selling to each consumer at a different price. While traditionally a near-impossibility with durable product and customer anonymity, the Internet (and the mobile access device even more so) offers a high degree of customer identification. Some of the same strategies that are used for delivering personalized content can be used to deliver personalized pricing. Strong statistical correlations may be used to intelligently associate a ZIP code with a favorable economic standing and offer a personalized “deal” at a
premium price. A user with a less glamorous ZIP code may be offered a personalized “deal” at a much lower price. Direct mail campaigning has employed this pricing strategy for years.

With the relative maturity of information technology, potential buyers can be classified along several dimensions to offer very personalized prices. A shining example of highly personalized prices can be found at Lexis-Nexis. The price a user pays may depend on what kind of enterprise he represents (corporate, small business, government, academic), the size of his organization, what time of the day the database is accessed (more costly during business hours), how often the databases are used (volume discounts), which databases are used, whether information is merely viewed or if it is also printed, and so forth. Although a strategy like this will help to capture a larger portion of market (see Figure 4.3), the overhead of the infrastructure may be prohibitive for smaller companies.

Airlines have been noted for their high degree of personalized pricing as well. Pricing structures exist which discriminate along the lines of business vs. pleasure, day vs. night, price sensitivity, and travel flexibility. Complex yield management systems help airlines sell as many tickets as possible at a high price, and cheaply disseminate information about reduced fares, which have not sold in the days preceding a flight. A desirable side effect of this pricing strategy is that it is cheap to conduct with the Internet as a medium and participating firms can infer a highly relevant, yet inexpensive form of
market research to predict future demand. A reasonable model for an airline’s pricing strategy is entitled “Several Versions” in Figure 4.3.

In summary, the same information used for personalized delivery of content can be (and should be) used for personalized pricing. When properly employed, personalized pricing can lead to a higher overall yield of the market. This strategy, however, only works if a seller can properly identify its buyers. Monopolies aside, many companies will run the risk of losing a customer to a competitor if the “personalized” offer is too expensive. Promotional and discount versions of items can be used to capture more of the market and to estimate future demand for the same product.

4.2.2 Versioning

Versioning is the practice of offering a product line and allowing users to choose the most appropriate version of the product. A commonly used strategy spanning several types of markets (e.g. automobiles, basketball shoes, and computers to name a few) becomes even more poignant when applied to information-based markets. Coupled with the tremendously cheap distribution channels (i.e. the Internet or data service gateways), information can be versioned and priced to maximize revenue.

In order to maximize profits with a versioning strategy, a purveyor of information will attempt to make the total value created as large as possible and then extract as much
of that value as he can. Two basic principles, as laid out by Shapiro and Varian [16] are as follows:

- Offer versions tailored to the needs of different customers. A full line of information products will maximize the total value of the information you are providing.

- Design these versions to accentuate the needs of different groups of customers. Emphasizing customer differences allows you to extract more of the value you have created, as each customer selects the version that best meets his or her needs.

The burden of selecting the appropriate version is placed on the consumer. The process becomes one of self-selection. A seller who understands his potential customers will design the versions with sufficient differences in order to draw a clear distinction between them.

Durable goods have long used versioning strategies. In the publishing industry, for example, many books come out in two versions: a pricey hardcover and a more affordable paperback. To accentuate the differences between the versions, the hardcover is often released several weeks prior to the release of the paperback. The distinction drawn by the publisher is that someone with a higher demand for the book may wish to purchase a more durable copy (hardcover) or may wish to own a copy as soon as it hits the market (time sensitivity). In either case, the publisher succeeds in extracting more
revenue with a “superior” version, while capturing the more price-sensitive, patient consumers with the paperback version.

Information goods, such as software, are known to employ a similar strategy. Several versions of a piece of software may be on the market to capture more revenue from more demanding customers, yet still retaining a revenue stream from more price-sensitive customers who demand a similar product. A feature-rich version of photo-editing software may be preferred, or even required, by graphic design personnel. As corporations will usually pay for their employees’ software, price-sensitivity is not an issue. Individuals interested in graphic design may not be able to afford the heavy cost of some of these packages, but do not require all the bells and whistles included in the professional package. By capturing a good portion of both segments, a company will increase its percentage of the total market captured. Refer to “Three Versions” in Figure 4.3 for an example of a multiple version strategy.

4.2.3 Group Pricing

Similar to the versioning strategy discussed in the previous section, group pricing can help segment a market, thereby assisting the capture of a larger amount of revenue. Versioning, as discussed, allows for a self-selection process on the part of the consumer; if a consumer demands the most feature-rich version, he will likely pay the highest price. Group pricing allows the seller to segment the market. There are several characteristics
of a market that might lead a seller to choose a group pricing strategy. These will be examined in this section. Additionally, a few examples of group pricing of information goods will be discussed.

A first characteristic that lends itself to a group pricing strategy is segmented price sensitivities. If members of different groups systematically differ in price sensitivity, a seller can profitably offer them different prices. Student and senior citizen discounts are commonplace examples. This follows from the simple economic principle that a profit-maximizing seller will want to charge a lower price to consumers who are more sensitive to price. Such strategies are presently employed with textbooks on a worldwide basis. Information or experience goods, such as software and movie tickets, are markedly cheaper—sometimes orders of magnitude cheaper—in lesser-developed countries than they are in the United States [16]. While local economies dictate that the U.S. price will not generate sales in lesser-developed countries, an important caveat must be mentioned. Information goods, those that can be easily replicated or distributed (e.g. via Internet technologies) are subject to arbitrage across national and continental boundaries. Producers of such information must take notice and ensure that a change in price is also reflected in a change in quality or content. For example, if an information good is available much more cheaply in Vietnam, it should be published in Vietnamese. To most U.S. buyers, this will render the decidedly cheaper version of the good completely useless.
A second characteristic that may lend itself to a group pricing strategy is the network effect. If the value of a product to an individual depends on how many other members of his group use the product, there will be value to standardizing on a single product. The previous statement is merely the tip of the iceberg when discussing network effects. In fact, Bob Metcalfe—founder of Ethernet—posited that the value of a network goes up as the square of the number of users. The network effect often leads to a winner-take-all or a standard-take-all conclusion. Frequently, competing technologies will choose to employ preemptive measures to forestall a market decision on the appropriate technology or standard. A company that has exploited the network effect quite well is Microsoft. Microsoft’s Windows 95/98 and Windows NT operating systems have become the personal workstation of choice for most home and business users. Individuals and businesses can reap great value from the ability to exchange files and programs with other individuals and businesses using the same technologies. Additionally, Microsoft’s cheap operating systems (very often packaged by OEM agreement with new computers) helped blow out the user base. Today, when a new consumer or business must choose an operating system, Microsoft’s offerings are much more attractive than Unix, Linux, or Macintosh offerings. This is not to suggest that Microsoft has produced a superior operating system, only that the network of Microsoft OS users adds value and demand for the product. The network effect is a very powerful externality evident in several information markets today.
Customer lock-in is a third characteristic that may lead to a group pricing strategy. If a seller chooses to standardize on a particular product, it may become very expensive for the customer to make the switch to a competitive product owing to the costs of coordination and possibly even retraining. As such, it may prove beneficial for companies to offer attractive packages to new users in order to get them "hooked" and to cultivate them as future buyers at full cost. Credit card companies often employ this strategy with college-age students. Students are looking to build a credit line, and creditors are willing to offer "low" introductory rates to grow a user base. It is widely known that creditors make a significant amount of money from financed payments. After the initial introductory period it over, students will be paying higher rates. If credit has been less-than-perfect, the student may have trouble getting approved for other credit cards and must rely on the formerly discounted creditors high financing rates.

A final characteristic that may indicate an opportunity for group pricing is the case of sharing. In many cases, it is inconvenient for the individual user to manage or organize all information goods that he or she will want to consume. Information intermediaries such as libraries or system administrators can perform such a coordination task. It is often not economical for an individual consumer to own every DVD title or every work of fiction available. These are often "use once" or "use infrequently" items which may not provide enough of a return on investment to justify a purchase by an end consumer. It is well understood that libraries and video rental stores have a high demand and lower price sensitivity in purchasing their goods (books or videos); a customer is
unlikely to frequent a video store that does not stock movies he would like to see.
Likewise, a library is only as good as its collections. "Infrequent use" items can demand
a higher premium that consumer goods, and should be priced as such. When coupled
with versioning as described in Section 4.2, this becomes even more powerful. Consider
the example of an online research service. Several versions of the service may be made
available to different interested communities such as personal (highest price-sensitivity,
least specialized) to business (lower price-sensitivity, more specialized—business
interests) to legal (similar to business, but perhaps even less price-sensitive) to library
(highest demand for all resources, highest demand by library-goers to maintain all
information.) If it is cheaper in the long run for an intermediary such as a library or a law
firm to fund a shared subscription, a seller will price his good higher. If the cost to
manage and use the information at a per-user level is cheap enough, shared purchases
will not make good economic sense.

4.3 Lessons Learned from WWW Revenue Models

At the dawn of e-commerce on the World Wide Web, the playing field was fairly
level. Most online retailers were boutiques offering niche products or services; the online
customer base, though, was decidedly small. Today’s e-commerce is characterized much
more by customer relationship management (CRM) than it was when the revolution
began. Customer acquisition and customer retention are now key components of
successful WWW vendors. This section aims to discuss the benefits of strong CRM as
well as some of the CRM practices e-businesses have adopted.
In the fully automated sales cycle of e-commerce, the key differentiator for most products has historically been price, followed by shipping methods and shipping costs [8]. The zero-margin characteristic of this type of e-commerce will certainly come to an end (and in many cases has already come to an end). No longer is price the sole driver of e-commerce. Vendors today must work harder than ever (and pay more than ever) to acquire and retain its customers [9]. This entire cycle of attracting and retaining customers is customer relationship management. Outside of the ENGAGE – STOP – BUY pathway, three management technologies will be explored: post-sales follow-up, customer evaluation and segmentation, and stickiness drivers. This is shown graphically in Figure 4.4.

Figure 4.4: Customer Relationship Management Technologies

Source: International Data Corporation, 1999
Juliana Nelson [8] has defined CRM as the strategy of servicing the customer relationship through the following steps:

- **Determining satisfaction.** Was the acquisition cost to the customer offset by the experience and the deliverable? Was the customer’s expectation level set correctly and met?

- **Analyzing profitability.** Was the cost to acquire and service this customer offset by revenues earned? Will this customer’s potential exceed the cost of attracting, selling, and servicing him?

- **Building the relationship.** Having identified profitable customers, what financial, personalized, structural, and service-oriented benefits can be provided to strengthen the relationship?

These three characteristics of CRM can be used as measuring sticks as we explore post-sales follow-up, customer evaluation and segmentation, and stickiness drivers.
4.3.1 Post-Sales Follow-Up

Post-sales follow-up has traditionally followed one of two paths. If a company generally sold a low-margin good to several customers, minimal relationship management was undertaken. On the flip side, companies that sold high-margin goods to few customers often offered much more extensive follow-up care. Primary strategies for post-sales follow-up include customer self-service, customer feedback, and service centers.

On Internet time (and Internet dollars), follow-up relationship management can be cheap and can yield fantastic results. Customer self-service is an effective low-cost conduit for keeping existing customers happy and coming back. Small services such as real-time order status (e.g. FedEx, buy.com, amazon.com, etc.) or troubleshooter utilities
(e.g. Microsoft, Dell, etc.) can increase loyalty and lay the groundwork for follow-on sales from many customers. These services are "cheap" to implement, as they do not involve staffed service people on the vendor's side.

Information yielded from existing or former customers is an extremely valuable tool in managing current and future customer relationships. As Nelson posits, "Tapping into customer experiences and recommendations can provide Web merchants with objective reviews and new ideas of what works online. Implementing customer recommendations goes a long way in growing appreciation and confidence." Analysis of this sort can be collected in several ways, ranging from independent third-party evaluations to survey instruments. Third-party analysis companies such as WebTrust and BBBOnline (independent third-party evaluation) or Bizrate.com (customer feedback from digital cash registers) aim to provide unbiased feedback in a timely fashion. Arguably the most useful information can be yielded from lost customer analysis. As discussed in Section 3.2, high switching costs can often lead to customer lock-in. In order to lose a customer, that customer's switching cost must have been low enough to warrant the extra time or money to use another service. If a service provider is able to pinpoint the reasons for losing a customer, he has identified perhaps the most critical information about the online experience and areas for improvement. Lost-customer analysis tools are not well developed at this point. Some of the previous methods (e.g. survey instruments), however, can be used to accomplish this task.
When a business attains an appreciable number of customers, it becomes worthwhile to consider manned service centers. The costs of manned service centers clearly exceed those of self-service solutions; help desk functionality, though, has long played an important role in customer relationship management. The marriage of traditional call centers and technology has yielded such opportunities as real-time chat and voice recognition service applications. Automated e-mail service management has recently surfaced from companies like Kana Communications and Silknet. This type of tool employs intelligent routing of customer service-related e-mail, thereby reducing the cost on the call center side and reducing the time for a customer to receive a response.

4.3.2 Customer Evaluation and Segmentation

The more information a vendor knows about his customer, the easier it is to manage the customer relationship. With identity linked to existing customers, vendors often know at least some information about their customers (e.g. name, ZIP code, etc.). Even at the simplest level of segmentation, this can be very valuable. Recognizing that many vendors would prefer to distinguish between their customers (e.g. less profitable / less demanding vs. more profitable / more demanding), customer evaluation and segmentation become very powerful tools. Intelligent use of customer segmentation data will help vendors answer the question “who is a good customer today, and who will be a good customer tomorrow?”
Customer segmentation can be characterized as the action item that follows from personalization. In many cases, customers will even go so far as to segment themselves, leaving the vendor with the relatively simple task of picking up contextual clues. Customers may even give information about their preferences freely (or with a slight incentive). Profiling can be active, as described above, or passive, in the form of behavioral profiling. Behavioral profiling can range from simple click-stream analysis to detailed counts of “who is on a site, where they came from, how long they spent online, what they say, where they logged off, and whether they purchased anything” [8]. After this information is compiled, fairly complete profiles can be constructed. These profiles can be used to personalize a user’s experience, assist in decision making for targeted ads, or to associate users in communities (e.g. like frequent flier clubs offered by airlines). Additionally, customer intelligence applications have been developed which help merchants determine who their most profitable customers are. Data mining techniques can help businesses classify customers into profitability groups, which can be used to “determine the appropriate level of service based on the lifetime value of each customer.” Ideally, a service like this will not only be able to identify most profitable customers, it will also allow merchants to focus on converting unprofitable customers into profitable ones without incurring additional customer acquisition costs.

Customer evaluation is a relationship management technique that pushes segmentation one step further. Through data mining of previously captured user profile data, automated techniques such as collaborative filtering can be applied to offer
customized experiences. A collaborative filtering engine makes use of click-through data and continually learns about a user from his actions on a web site. Such profiled information is pooled over large numbers of users and recommendations are made based on what other users with similar behavioral patterns have purchased. An example of collaborative filtering can be found at amazon.com. When a user implied interest on a book by clicking on a link to view more information, he is also presented with other books that were popular among purchasers of the first book. Because the collective preferences of such a community are a good predictor for how its members will like items they have not yet tried, the engine draws upon its knowledge base to make recommendations with a relatively strong level of accuracy.

4.3.3 Stickiness Drivers

Marketers and merchants alike are working harder than even to ensure that today’s customers remain customers tomorrow. One metric that has been devised to determine how well a merchant retains its customers is “stickiness”. Stickiness is defined [27] as “anything about a web site that encourages a visitor to stay longer before clicking away and also to return to it in the future.” Murphy [14] remarks: “A sticky site, many prospective spenders believe, has a strong grasp on its visitors and is therefore a good place to advertise.” Stickiness is often a good indicator that a service and a customer are a good match. This leads to such positive side effects as customers who welcoming marketing material sent by the merchant or customers who are not turned off by
"spamming" promotions. In a few brief statements, we have built an argument in favor of stickiness; but how does a company achieve stickiness? This section will explore a handful of stickiness techniques used today.

E-commerce newcomers have traditionally used incentive campaigns to attract an initial customer base. Such programs vary greatly, but have a common goal: to drive repeat traffic. These programs work to create stickiness with the merchant in exchange for some form of currency—miles, points, etc. Loyalty programs were among the first incentive campaigns on the Internet. Loyalty programs typically revolve around one particular site. Their successors, affinity programs, leverage a much larger network of commerce related sites. Clickmiles (from Netcentives) and MyPoints (from MyPoints.com) provide members with promotional offers across several unrelated sites. Purchases, click-throughs, and time spent online are among the many factors which may contribute to a consumer’s point or mile accumulation. As consumers become more and more entrenched in their respective point hoarding, they also become more likely to purchase products or services from merchants on the same network. As should be evident, the larger the network, the more value that can be delivered to the consumer. With points or miles earned from affinity programs, consumers can earn airline miles, gift certificates, or discounted rates.

Online communities that allow customers to interact with one another in addition to the company have been played a strong role in generating stickiness on some web
sites. Focused communities (e.g. hardware hackers, calculator enthusiasts, or sports fans) have desirable stickiness levels and often include cross-selling opportunities. Sports fan boards may market sports merchandise relevant to the topic of discussion. While many aspects of online communities have succeeded, they will probably not translate well to the space of mobile data services. Message boards and frequent input from a user are difficult given the form factor of most mobile data devices. This sort of incompatibility will be reiterated in the following section.

Pioneered by Amazon.com, one-click ordering has become wildly popular among many e-commerce merchants. One-click ordering eliminates the need to fill out forms each time a purchase is made from an online merchant. The real-life analog would be purchasing clothes at a store and shouting to the clerk as you leave: “Hey, I’m getting these two shirts.” The check-out experience is instantaneous. There is little time for the user to get frustrated with more forms (the analog is long lines) and abandon the purchase altogether. In economic terms, the customer’s acquisition costs of the goods are lower when they do not have to spend extra time in the purchasing process. Some technologies have taken a step even further to try to universalize, as much as possible, purchasing across all commerce sites. These ambition digital wallets will automatically fill forms on affiliated sites. When a merchant participated in a digital wallet services, it can simulate one-click (or limited-click) purchasing, keeping the consumer’s acquisition cost low.
As previously mentioned, personalized content and targeted marketing have yielded markedly better than average results in click-through rates and purchase rates. It should come as no surprise, then, that personalized content and targeted marketing are also very important drivers of stickiness. Benefits of personalization include deeper customer relationships, a clearer understanding of user wants and needs, increased site traffic and functionality, and increased revenue through more profitable customers. Lock-in leading to perceived high switching costs could help a site maintain a loyal customer base and increase site stickiness.

4.4 Recommendations for Mobile Revenue Models

Ideas explored in the previous chapter (What Makes Mobile Unique) and the previous section (Lessons Learned from WWW Revenue Models) form a sound basis for recommendations for mobile revenue models. The recommendations laid out in this section will focus on mobile data services (as opposed to infrastructure) and will aim to bring together many of the elements discussed in the previous two chapters. These recommendations will form the basis for an analytic rubric, which will be developed in the next chapter.

Mobile data service providers should aim to complement the desktop, but avoid replicating it. Examples include the integration of schedule and contact information into smart phones or palm pilots. The manufacturers of these devices understand that limited form factors will not allow for a complete switchover from
desktop PC to handheld device. They should embrace both the old (PC) and new (handheld) and creating a synergy between the two. In the case of a mobile data service provider that also provides PC-based solutions or acts as an integrator, this should be fairly straightforward. In the case of a pure-play mobile data service provider, attempts should be made to make the experience as seamless as possible. This may increase the demand for common (or portable) profiles.

**Functionally, mobile service providers should target value-added services leveraging those aspects of mobile that make it unique.** The “uniqueness” of mobile service is centered on location-awareness, time-sensitivity, and degree of personalization. For a service to be considered value-added, it must extend above and beyond what the consumer is accustomed to. A service which merely pushes stock quotes to a mobile phone does leverage the immediacy made available by the phone (as well as the demand of the consumer), but it is not as valuable as a service which can filter stock ticker information and phone the consumer with an update when a stock’s price varies by more than a pre-determined amount. Mobile data service providers must be cautious of becoming commodity providers. The simple economics lessons discussed earlier in this chapter demonstrated that information commodities tangentially approach zero revenue (as marginal revenue approaches zero).

**Follow the lead of the WWW forerunners; implement customer relationship management systems.** CRM is strongly correlated with happy customers, repeat
business, and properly scoped targeting marketing. Additionally, CRM can be one element that helps to differentiate a near-commodity product. A company can charge more for a functionally equivalent product if its reputation for service and support are superior to that of its competitors.

The balance of this section will discuss recommendations for achieving a critical mass, recommendations for pricing models, and metrics which will help mobile data service providers determine whether or not their service offering are successful.

4.4.1 The Critical Mass

One key to becoming profitable in mobile data services is to amass a critical user base. In a previous section, we discussed customer relationship management (CRM) as an excellent model for maintaining a growing a solid user base. This section will discuss the issues surrounding the initial development of a user base. Included among them are: support for those building the mobile infrastructure, consumer education, and more CRM.

The mobile infrastructure and mobile data services closely parallel the dilemma of the chicken and the egg. Mobile data service providers are hesitant to invest in a market without a strong foundation (i.e. without the infrastructure in place). Likewise, companies building the mobile infrastructure are hesitant to plunge headfirst into it, throwing down big dollars to deploy a system which does not have clear-cut demand.
Several factors, though, are ameliorating concerns for both sides. Very positive reports from information technology analysts [15], deep-pocketed venture capitalists, and promising early successes in other parts of the world (e.g. Japan, Scandinavia) are leading to a preliminary conclusion: mobile service providers and companies building the mobile infrastructure have much to gain by working together. By generating buzz for the entire market (service and infrastructure), mobile service providers will strengthen their own respective positions and inspire a quicker build-out of the infrastructure.

Laszlo [26] reports that one elementary issue that has not yet been appropriately addressed is consumer education. In his analysis of impediments to adoption of mobile data services for mobile device owners, he found the following reasons for not adopting the services:

- **Don’t Need Mobile Data Service**: 39%
- **Data Services Too Expensive**: 17%
- **Don’t Know if Services Available**: 17%
- **Equipment Does Not Support Services**: 14%
- **Don’t Know How to Use**: 7%
- **Data Services Not Available**: 6%

The three bold items above comprise over 60% of potential mobile data services customers. Additionally, the three bold items are all strongly correlated with consumer
education. Perhaps consumers do know what services are available, but the most striking
cconcern is that such a large fraction of users do not feel they need mobile data services.
While this may be true in some cases, it is also quite likely that potential users are
unaware of value-added service offerings. The services that complement the desktop
experience can provide this type of value-added experience. Mobile data services firms
must be willing to spend money in order to educate its customers. With very high
expectations placed on mobile data services over the next several years, firms must not
shy away from high initial customer acquisition costs.

As mobile data services are clearly in the early stages of development, the precise
formula for customer satisfaction is uncertain. As such, practices as described in the
CRM section will become increasingly important to firms. This study’s recommendation
is to be willing to experiment with service, delivery, etc. in order to create the best
customer experience. Do not disrupt existing customers’ experiences in the process, but
do convey a commitment to figuring out what will work best. In the interim, offer
reduced rates to join or subscribe. Practices like these will help induce a loyal customer
base and will increase demand for a firm’s services, thereby allowing the firm to offer its
service at higher rates once the tinkering tapers off.
4.4.2 Information Pricing Models

In the early years of mobile data as an information good, providers should not expect large margins from users. In fact, both today and over the next three to five years, the installed base of customers is a much better metric for success than revenue. As with several information-type goods (especially time-sensitive goods like market news), it is likely a good strategy to give away or charge very little for the service. McCarthy’s survey [17] of ten major wireless carriers demonstrated that nearly 100% of mobile revenue is expected from subscription services in the year 2000. Future estimates by the same ten firms project that by 2002, only 69% of mobile revenue will come from subscription services, while 28% will come from mobile commerce and 3% from mobile advertising.

Today, these subscription services are usually via carriers such as Verizon, Nextel, and Sprint PCS. In many cases, these carriers have partnered with firms who provide a “start page” and a “walled garden” Internet experience. For example, Nextel is partnered with MSN, and subscribers to Nextel’s wireless Internet offered are welcomed with the MSN Mobile portal permitting access to financial, travel, news, weather, sports, and entertainment information. Additionally, users of the service can access their MSN Hotmail accounts or surf the web. The two firms making the bulk of the money from subscription services in this example are—not surprisingly—Nextel and Microsoft.
Lessons can be learned from the WWW pricing models previously discussed; personalization, versioning, and group pricing could each be subscription mechanisms to help target potential customer groups. Some of today’s wireless data service fees are flat monthly fees. Others are charged by the minute or by the kilobyte of data transferred. Different pricing models will undoubtedly work well with different customer segments, and providers would do well to target them appropriately. In light of the knowledge that lower income households are expected to be the highest growth sector, carriers should consider which components are expendable in a “bare bones” version of an offering.

Several services are available today, with low-to-moderate differentiation. Two ways to win or maintain market share are:

- **Enlist a captive audience.** If a wireless community is locked-in due to introductory offers or through affiliated with local telephone service provider, he or she is going to remain part of the install base

- **Offer a more differentiated product.** Do not worry about offering the best product on the market. Instead, be aware of what you offer and how it stacks up against the competition. Whether it is better quality of service, more value, more personalization, it does not matter. Work hard to avoid becoming a simple commodity with low switching costs for the customer.
4.4.3 Metrics for Success

Measuring success is not always an easy task, especially in developing (or exploding) markets. Several ideas will be briefly discussed in this section and will be wrapped tightly into a rubric for evaluation in the following chapter.

When the install base is growing and introductory offers abound, bottom line vis-à-vis competitors may not be the most accurate measure of success. In fact, negative bottom lines should be expected from companies experiencing tremendous growth in subscriber base and the concomitant growth in investment in offerings and partnerships. When the market begins to settle, however, bottom line will play a large role in determining the winners and losers—who would be acquired, who will sink, and who will eventually dominate.

Several common web metrics can be reapplied in the mobile service offering domain. Include in this list are:

- Average time per visit
- Average number of page views per visit
- Average time between visit
- Number of unique users per month
- Number of subscribed users
- Number of active users (unique users in last x days)
These numbers can prove to be a marketer's best friend or worst nightmare. Firms looking to taut their reach will do well to work to optimize these numbers.

**Mining of profile data** (such as usage tracking) and comparing against target profiles can help a firm see if it is meeting its goals on several levels. This includes geographic reach and time statistics, among others.

Feedback from customers is invaluable. If it can be gathered in an unbiased fashion, **customer survey results** can provide a fantastic data point for evaluation. How does one firm's service offering hold up as compared to its competitors? While most likely a relative measure, it should be a fairly clear indicator of success or failure if applied properly.

A lesson from customer relationship management is that **lost-customer analysis** can provide some of the most honest feedback regarding how and why your firm is lagging behind the competition.

While certainly not a complete list, the above provides a useful basis for further evaluation of whether companies should consider entering the mobile data services market. The following chapter will work to apply some of these metrics against companies to determine mobile data services market fitness.
5 CASE STUDIES

Some hurdles exist which could prevent mobile data services from ever taking off in the United States; chief among them is adoption. Laszlo [26] warns that pricing strategies will play an increasingly important role in the successful deployment of mobile data services. He points to a well-known example comparing telephone pricing in Europe and the United States: “In the U.S., per-household use of the Internet soared after companies introduced flat-rate pricing. In Europe, where users pay for local calls by the minute, Internet usage remains at a fraction of the levels in the U.S.”

While mobile data service providers would likely prefer to be immediately profitable, lessons from Chapter 4 illustrate the requirements of a critical mass, customer lock-in, and customer relationship management. In the short run, it is not necessary for larger companies (e.g. Palm, AT&T, etc.) to insist on mobile data service profitability. Rather, appropriate conditioning of the customer to use the services (and profitable additional features) will prove the more fiscally responsible choice in the long run. Illustrating this logic, AT&T shifted its PocketNet service from a metered rate to a flat rate in 2000 Q1 with positive results.

Important to note is that some factors of mobile data service initiatives are difficult to quantify. A company offering a broad range of consumer services may strengthen its own brand significantly by offering additional services, even if they are not
immediate cash cows. Several wireless phone carriers have boosted their brand recognition with highly public announcements and marketing around narrowly adopted technologies.

The following section is concerned with surveying the services many of today’s wireless carriers are offering their consumers. Section 5.2 is devoted to developing a rubric for evaluating mobile data service providers in U.S. consumer markets. The chapter will continue with case studies of a few entrants in the market: Verizon Wireless and Vindigo. What should become evident is that no one path is correct and that certain difficult-to-quantify principles (e.g. customer relationship management and brand management) are as important to many companies as top- or bottom-line numbers from mobile data services initiatives.

5.1 A Survey of the Service Offering Landscape

In an effort to complement the model introduced in Section 4.2 (Information Pricing Models) with a real-world example, a market overview from May 2000 is shows in Table 5A. The three most commonly discussed pricing models for mobile data are:

- **Time-metered service** bills users per minute of access or may share a bucket of pre-paid minutes with a voice plan. Time-metered service works in a fashion similar to long distance service in the United States.
- **Byte-metered service** bills the user per byte or kilobyte of data transferred from the handset.

- **Flat rate monthly service** bills the customer once for access to the service for the entire month. Occasionally, a limit is placed on the amount of time or data, but the limits are often rather high.

### Table 5A: Today's Consumer Mobile Internet Plans

<table>
<thead>
<tr>
<th>Carrier</th>
<th>Mobile Internet Offer</th>
<th>Mobile Internet-access fee</th>
<th>Mobile data pricing</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AirTouch</td>
<td>Yes</td>
<td>No</td>
<td>Data minutes billed at voice rates – minutes come out of bucket</td>
<td>MSN co-marketing mobile portal partnership; Vodafone merger; Plans big prepaid push</td>
</tr>
<tr>
<td>AT&amp;T Wireless</td>
<td>No</td>
<td>No</td>
<td>Specialized business PocketNet plan only</td>
<td>Premium plan adds calendaring, favorites, to-do list; no consumer offer yet</td>
</tr>
<tr>
<td>Bell Atlantic</td>
<td>Yes</td>
<td>$9.95 / mo.</td>
<td>Data minutes billed at voice rates – minutes come out of bucket</td>
<td>Verizon Wireless: joint venture with Vodafone/AirTouch and GET merger creates largest wireless carrier with 23 million subscribers</td>
</tr>
<tr>
<td>Bell Mobility</td>
<td>Yes</td>
<td>No</td>
<td>Data minutes billed at 15 to 30 centers / minute – minutes come out of bucket</td>
<td>Multiple, well-connected wireless data plans; moving to let subscribers personalize their start screens</td>
</tr>
<tr>
<td>BellSouth</td>
<td>No</td>
<td>No</td>
<td>Text messaging for $3.99, $6.99, or $9.99 / mo.</td>
<td>No web browsing available; Joint venture with SBC to form second largest wireless carrier in US with 16.3 million subscribers</td>
</tr>
<tr>
<td>Cellular One</td>
<td>No</td>
<td>No</td>
<td>$5 Infopack: choice of 3 out of 21 topics delivered to handset</td>
<td>No email or Web browsing; SNET $7 Valentine's Day messages</td>
</tr>
<tr>
<td>GTE Wireless</td>
<td>Yes</td>
<td>$9.95 / mo.</td>
<td>Data minutes billed at voice rates</td>
<td>Email and personalized data; can use any IP address for email; Plans to introduce short messaging</td>
</tr>
<tr>
<td>Nextel</td>
<td>Yes</td>
<td>$14.95 – $19.96 / mo.</td>
<td>Data minutes billed at voice rates</td>
<td>Two-tiered mobile data offers: Basic plan for limited (walled-garden) content; Plus plan gives Open Internet access for $5 more</td>
</tr>
<tr>
<td>Rogers AT&amp;T Wireless</td>
<td>No</td>
<td>No</td>
<td>Text messaging only for $8 / mo.</td>
<td>No web browsing available</td>
</tr>
<tr>
<td>Sprint PCS</td>
<td>Yes</td>
<td>$9.99 / mo.</td>
<td>Data minutes come out of bucket; $9.99 fee included 30 updates and 50 free data minutes</td>
<td>Mobile Internet market leader; Continuously evolving plans and pricing; Passed 6 million subscribers in Q1 2000</td>
</tr>
<tr>
<td>US West</td>
<td>Yes</td>
<td>$19.95 / mo.</td>
<td>Unlimited Internet access and email – billed at voice rates</td>
<td>Email through USWEST.net; Directory services planned through US West Dex</td>
</tr>
<tr>
<td>VoiceStream</td>
<td>No</td>
<td>No</td>
<td>Text messaging only for $8 / mo. For 500 messages</td>
<td>Wireless modem service for $29.95 / mo.; building national network through roaming agreements</td>
</tr>
</tbody>
</table>

Source: Forrester Research, May 2000
While several models exist for pricing this type of information (i.e. mobile data), one seems most common from a quick glance at Table 5A—a hybrid between flat rate monthly service and time-metered service.

The hybrid model is likely popular due to the carriers’ interest in recouping large investments in these technologies. Section 5.2 will reinforce the notion that revenue is not the only—and possible not even the primary—factor for evaluation of mobile data services candidates.

5.2 A Rubric for Mobile Data Service Candidates

Shapiro and Varian offer a compelling set of guidelines for pricing information; their recommendations, however, are very general. This brief section will define a qualitative rubric for measuring a company’s ability to compete with a mobile data service offering. From this qualitative assessment, a quantitative measuring stick will be devised.

Three major components—as well as several subcomponents—are critical in assessing fit for the mobile data services market. These components are competitive landscape, functionality, and financials. The balance of this section will detail these components and conclude with a scorecard for future case studies.
The first critical component to evaluate is the **competitive landscape**. It is important that a company know its target market and target product. As mobile data services can range from the very general (e.g. “gateway to the Internet”) to the very specific (e.g. your portfolio positions in SMS alerts hourly during trading hours), defining the competitive landscape is not a trivial task. What is the estimated size of your target market? How many players make up the lion share of the market? What portion of the market can you hope to earn by organic growth? …by acquisition?

The next critical component to evaluate is **functionality**. The first question a service provider might be inclined to ask is: “Am I selling a commodity, or a differentiated product?” Financial success can be achieved in both arenas, but a service provider had better know and take advantage of his bread-and-butter offering. As commodities compete primarily on price and brand name, these are the two most important data points. If a differentiated product or service, an ideal mobile service offering would hit the “sweet spot” to find ways to take advantage of those characteristics which make mobile offerings unique: time sensitivity, location sensitivity, and personalization.

The final critical component to evaluate is **financials**. It would be naïve to think that mobile service offerings should be immediately profitable, but any investment should begin with calculated anticipation that it will help the company make money in the long run. In markets as new and ill defined as several mobile data services markets, near term
wins may be found in positive press coverage or service adoption rates, not necessarily profitability. As a result, it is not current revenue but projected revenue (and profitability), which will help determine success or failure along this metric. Some of the questions that need to be asked include: Is it possible to distinguish between customer groups and offer versioned or group pricing? Are there possible synergies between this mobile offering and existing product or service offerings? Is it possible (or likely) that this service offering will cannibalize another portion of our business? Does our revenue model hold up in the long run? …if not, what changes must be made? …what is the critical mass before what changes can be made? …when can we expect to achieve this critical mass?

The three components for evaluation lend themselves nicely to a quantitative approach. The scorecard in Table 5B is one way to examine how fit a company is for entry/continued presence in their mobile data service market.

Weighing each of the components equally, a rudimentary scoring method would be to classify a company’s fitness as positive, neutral, or negative. In order words, the scorecard may represent “grades” such as an “A” (positive), a “B” (neutral), or a “C” (negative). An evaluation criterion could then be used to determine an overall market fitness. Such a criterion may read:
IF there is at least one A AND there are no C’s

THEN declare company fit for market presence

ELSE declare company unfit for market presence

This will be the criterion used to measure fitness in the case studies presented in the following two sections.

Table 5B: Market Fitness Scorecard for Mobile Data Service Providers

<table>
<thead>
<tr>
<th>Score</th>
<th>Component</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Competitive Landscape</strong></td>
<td>How well defined is the target market?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How large is the target market?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>What portion of the target market is up-for-grabs?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>What portion of the target market can be earned by organic growth?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>What portion of the target market can be earned by acquisition?</td>
</tr>
<tr>
<td></td>
<td><strong>Functionality</strong></td>
<td>Is my product a commodity? If so...</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- How competitive can I afford to be on price?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- What is the strength of my brand name?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Is my product differentiated? If so...</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- How does my product make use of time sensitivity?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- How does my product make use of location sensitivity?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- How does my product make use of personalization?</td>
</tr>
<tr>
<td></td>
<td><strong>Revenue Projections</strong></td>
<td>How soon can this service offering become profitable (self-sustaining)?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can we distinguish between our customer groups to offer different prices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>to different consumers?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do synergies exist between this offering and existing product or service</td>
</tr>
<tr>
<td></td>
<td></td>
<td>offerings?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How long can the existing revenue model sustain?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Are there plans to change the revenue or pricing model after a critical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mass is reached?</td>
</tr>
</tbody>
</table>

Source: Original
5.3 Case Study: Verizon Wireless

Verizon Wireless, that result of an early 2000 merger of several wireless providers, is the nation’s largest wireless carrier. Serving over 25 million voice subscribers—largely comprised of subscribers from the pre-merger Bell Atlantic Mobile, Vodafone/Airtouch Cellular, GTE Wireless and Primeco—the company has already accrued over 3 million Mobile Web subscribers. Verizon’s consumer mobile data service offering includes a wide range of information and commerce functions at a competitive monthly rate. Verizon’s challenge over the next few years will be to develop long-term revenue streams and to continue capturing a significant fraction of the emergent mobile Internet access market.

Competitive Landscape. The United States boasts over 100 million mobile phones in use today. Verizon Wireless, the nation’s leading carrier, services over 25 million of these phones [5]. A September 2000 JD Power and Associates annual report reveals that [4]:

- forty-six percent of U.S. households with incomes of $25,000 or higher report having a wireless phone, and
- twelve percent of all wireless households have the ability to access the internet via wireless handsets.
With merely five percent of U.S. households accessing the Internet via wireless handsets, the market has extraordinary potential for growth. In fact, the Yankee Group projects that the wireless data market is expected to grow from $1.8 billion last year to $13.2 billion by 2003, with up to 25 million wireless data users expected nationwide by 2002.

Verizon Wireless’s large install base and place in a burgeoning consumer market are clearly positives. Leveraging its own voice customers will be one way the company can combat the uncertainty of the market expansion. Exclusive agreements (e.g. one year service contracts) lock the customers into Verizon’s other offerings, thereby collecting more and more revenue from its existing customers. In terms of competitive landscape, outlook is very good. Verizon Wireless scores an ‘A’.

**Functionality.** Providing such a wide array of services ranging from entertainment guides to stock trading applications, Verizon Wireless has been able to attract many types of consumers to its Mobile Web offering. Added in August 2000, personalization techniques allow the consumer to customize his Mobile Web start page and to receive periodic alerts of his choosing. Moreover, users of the Mobile Web can enjoy PDA functionality in the form of a personal organizer with calendar, an address book, and to-do lists. Verizon Wireless’s Associate Directory of Marketing Mary Shully touts the service’s capabilities; users can “comparison shop, book airline flights, make restaurant reservations, read a daily horoscope, and keep up with your favorite sports team.”
Working to create a differentiated product in a commodity market, Verizon Wireless has been bullish on customer relationship management. The company has provided online and manned support to all customers. It has restructured its pricing plans to match consumer demand. Several key content partnerships (over 30) provide consumers with familiar, digestible content. Some of the leading category partnerships are shows in Table 5C.

<table>
<thead>
<tr>
<th>Category</th>
<th>Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>News</td>
<td>ABC News</td>
</tr>
<tr>
<td></td>
<td>MSNBC</td>
</tr>
<tr>
<td>Finance</td>
<td>Money Central</td>
</tr>
<tr>
<td>Online Trading</td>
<td>E*TRADE</td>
</tr>
<tr>
<td></td>
<td>Fidelity Investments</td>
</tr>
<tr>
<td></td>
<td>CSFBDirect</td>
</tr>
<tr>
<td>Sports</td>
<td>Fox Sports</td>
</tr>
<tr>
<td></td>
<td>ESPN</td>
</tr>
<tr>
<td>Travel</td>
<td>Expedia</td>
</tr>
<tr>
<td></td>
<td>GetThere.com</td>
</tr>
<tr>
<td>Entertainment</td>
<td>Ticketmaster</td>
</tr>
<tr>
<td></td>
<td>Citysearch</td>
</tr>
<tr>
<td></td>
<td>Zagat</td>
</tr>
<tr>
<td>Weather</td>
<td>The Weather Channel</td>
</tr>
</tbody>
</table>

A September 2000 market analysis shows that the company’s strategy of putting the customer first is succeeding. Verizon Wireless’s customers are among those with the highest overall customer satisfaction rating in nine major U.S. markets [4]. The carrier, though, is not resting on its laurels. A Verizon press release recently announced that a future functionality planned for the service is “location-based services, such as delivery
of coupons for a nearby retailer or restaurant directly to the consumer’s handset, based on
specified preferences and usage trends [6].”

The company’s ongoing commitment to managing the customer as well as plans
for improving on its early successes position it well to be a leader in mobile Internet
functionality in the near term. Its early commendations seem a bellwether of future
successes. In the category of competitive landscape, Verizon Wireless scores an ‘A’.

**Financials.** Significant investments in the merger and several key partnerships represent
a considerable amount of upfront cost for this young market leader. Clearly, an early
strategy of growing the install base has been selected. The consumer-based revenue is
generated from the $6.95 service fee, which amounts to nearly $250MM per year (at
roughly 3 million subscribers). While this number may look astronomical, the initial
investment must be considered. In order to build out its wireless network (voice as well
as Mobile Web), Verizon Wireless invested over $3BB in the year 2000 alone [7]. Some
additional revenue will be gleaned from content alliances and from transactions taking
place over the network, but the long-term strategy is to blow out the user base to a much
larger size. While technology analysts project wide adoption, the jury is still out. At
present, the Mobile Web suffers from a cumbersome form factor. While Verizon
Wireless is working to ameliorate this concern by provided complementary web access,
sweeping social change must occur before the nation realizes the mobile web in each
home.
The enormous potential (95% of U.S. households currently untapped) and enormous uncertainty (will any of them adopt, or adopt this company’s Mobile Web?) leave the long-term financial question in limbo. Strong complementary offerings and revenue from its existing twenty-five-plus million voice customers will afford the company the opportunity to delay longer before realizing a solid return on investment. This slew of open questions scores Verizon Wireless a ‘B’ in financials.

Verizon Wireless’ “fit for market presence” recommendation is a strong one. While the financial question remains uncertain, a partially locked-in user base and complementary offerings mean that, in the long term, revenue will continue from voice as well as data applications. Verizon Wireless has a solid opportunity to own a large fraction of the market when it settles in five-to-ten years, but short- and medium-term profitability are not a guarantee.

5.4 Case Study: Vindigo

Exploiting location-based services, the 1999 start-up Vindigo has delivered on a very compelling value proposition: to become the portable yellow pages. As described on the company’s website, “Vindigo is a personal navigational tool—tell it where you are or where you’re going and it can find the nearest and best places to eat, shop, and play.” Realizing the value in location information and the limitations of the infrastructure, the
The company launched its mobile application in New York City in March 2000. While the application—which runs on the Palm OS—is location-sensitive, it is not location aware. Marketing Director Dave Shankman explained: “We want to build a good service on today’s devices, and when we can go wireless, we’ll add that to the mix.”

**Competitive Landscape.** The services offered by Vindigo are comparable to a portable city guide and yellow pages. At the time of launch, Vindigo had little competition, and it understood its market well. Content providers such as Zagat Survey, the New York Times, and Rand McNally already performed the expensive operation of generating information. As a recent study of mobile upstarts points out, “Vindigo doesn’t create the content—an expensive ongoing process; it simply delivers it.” Vindigo’s model involved partnering with the best in content generation (over 15 top tier content providers by Q4 2000). With approximately 7 million consumer-owned Palm OS devices in the United States, the company’s initial target market was attractive. With a model focused on urban locales—from New York City in March 2000 to nearly 20 cities by December 2000—a large percentage of this population would be served. By offering the service free of charge (an advertising-based revenue model) and with very low acquisition costs for the consumer (no additional hardware or service agreement), Vindigo has already surpassed 250,000 users. A December press release by the company touts the demonstrated “strong consumer interest in applications delivering location-based content to mobile devices.”
With rapid adoption and key partnerships in place, Vindigo has managed to secure its spot as a market leader very early. Providing location sensitive information without location-awareness is merely priming the company to partner with the best practice location-awareness tool when the time is right. In terms of competitive landscape, Vindigo scores an ‘A’.

**Functionality.** As a delivery mechanism, Vindigo’s service is not unique. Its proprietary interface and—more importantly—250,000 users make it a strong player in a commodity market. As a commodity, the service must remain competitive on price (free to the end user) and brand name (currently the strongest in its market). The brand advantage is due, in large part, to its first-mover status. It is strengthened by the many content partnerships; the service, however, is not immune to copycats. While in a good position now, the service is not pushing the envelope in terms of predicting consumer needs. The service is prone to look-alike competitors, many of whom could be of the content-provider-turned-delivery-mechanism variety.

As Vindigo is currently dependent on several other companies for the consumers’ end product, its market lead is precarious, if challenged. In terms of functionality, Vindigo scores a ‘B’.

**Financials.** Following a spring 1999 seed round of $1MM financing and a successful pilot launch in New York City in March 2000, Vindigo secured $9MM in
venture funding in April 2000. With a business plan to expand geographies and platforms while becoming profitable, Vindigo set out on an advertising-driven revenue model. Vindigo’s users are ripe for targeted marketing, which excites advertisers. A premium can be exacted from, for example, Finlandia Vodka as the advertisement will pop up when a consumer is searching for a nearby bar. Moreover, digital coupons are also candidates for advertising, making every storefront in the city a candidate.

Speaking to the common claim that advertising dollars will not constitute a sustainable revenue model, Vindigo CEO Jason Devitt explains: “While advertising is going to be an extremely important revenue stream for us, and one of the first that will kick in, I also expect that the overwhelming majority of so-called mobile-commerce transactions will hang off of a service like Vindigo. [30]” This alternate revenue stream is yet unproven, though promising. Balancing this negative is a booming install base and the prospect of adding support for multiple platforms. In the near term, advertisers will be able to target more consumers in each urban locale. In terms of financials, Vindigo scores a ‘B’.

Vindigo’s “fit for market presence” recommendation may seem a narrow call. The reader should note, however, that the service accrued its user base over a very difficult period for startups—post April 2000. Key issues to watch include the entrance of competitive services, the ability to deploy to multiple platforms, and the prospective partners in the location-determination realm.
6 CONCLUSIONS

In any consumer product or service business, appropriate pricing and revenue strategies are critical to long-term success. As expected, this continues to hold in consumer-targeted mobile data services. Lessons learned from the World Wide Web’s winners and losers demonstrate some of the signposts to consider for mobile data models. Leveraging those elements of mobile data that make it unique, though, will be key in driving both an industry-wide critical mass and an individual vendor’s long-term success. Several indicators point to the future of mobile Internet access from low-end smart phones. Data service providers should take heed by targeting customer groups accordingly.

While no single framework can capture the exact nature of fitness for a market presence, the preceding study offers one framework; it is based on evaluation of the competitive landscape, functionalities offered, and financial soundness. A qualitative assessment in each of these three categories leads to a high-level recommendation for or against presence in mobile data services in U.S. consumer markets.
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