From e-Commerce to m-Commerce: A New Competitive Environment for Wireless Vendors

by

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MOT, 2000

and

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Submitted to the Sloan School of Management
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Abstract

The Internet has created a revolution in business. It is allowing companies to connect like they have never been able to previously. Traditional companies are having to radically transform themselves as new business models become possible. These same companies are falling over themselves to cash in on the stratospheric corporate valuations brought on by the new economy, and at the same time are in a desperate battle with the same new economy companies to keep their customers, margins, and market share. However, the first shots of another revolution are being fired. Within five years, these same companies will be repeating their acts of desperation as the Web goes wireless.

Today, mobile phones have become ubiquitous tools for many businesses allowing employees, customers, and suppliers to stay better connected. However, wireless voice is only the beginning. As wireless data transmission becomes possible, the Internet turns mobile, and entirely new disruptions in the business world will be created. Where the Internet changed how business was conducted, the wireless Web will change where business is conducted, and just as the Internet has become strategically important to almost every company today, so will the wireless Web be just as important to companies tomorrow.

Complicating the matter, the mobile telecommunications industry is in a dramatic state of flux. Not only are handset manufacturers seeing exponential growth in mobile voice communications, but are also now beginning to grapple with the issues of data delivery over mobile devices. These next generation mobile devices will not only have to deliver voice services, but will also have to deliver data services such as email, e-commerce, and other Internet applications. This paper will address the strategic issues being faced by three mobile device manufacturers: Ericsson, Nokia, and Siemens. Furthermore, we will examine the effects the convergence of handheld and wireless devices, the multitude of standards, and the consolidation of industry players will have on an already competitive and complicated industry.

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CHAPTER 1: Introduction—From the Wired to the Wireless Internet

There seems to be little doubt that the Internet revolution occurring around the world is having dramatic effects on the way humans will live and interact. The biggest initial impact has been its effects on business. Initially, many individuals and corporations saw the Internet revolution as simply a fad that at worst would never affect them or at best would eventually go away. The economic growth created by new Internet based companies was merely a bubble that would soon burst, and we would all be able to return to our normal lives. However, neither of those things have occurred. The Internet has infiltrated practically all aspects of our lives in one way or another—from the way we get our groceries to the way we look for health care, to the way in which we entertain ourselves—and will be an essential mechanism for how we gather information.

Furthermore, it is becoming increasingly obvious that the Internet will permanently alter the current business environment. Companies, in particular, can no longer ignore the influence of Internet. It is creating an entirely new business environment that will force many corporations to reinvent themselves in order to remain competitive. Evolving technologies will drastically alter their traditional relationships with both their customers and suppliers, and they must be prepared to adopt those new relationships. If they refuse or are unwilling to, competitors will appear who will certainly be willing to make the necessary adjustments. Many will struggle to survive in this new environment, but its impact cannot be ignored, for according to Andy Grove, the
chairman of Intel, in five years time “all companies will be Internet companies, or they won’t be companies at all.”¹ The first question that most companies need to answer, therefore, is not whether the Internet should become a part of corporate strategic thinking, but when.

Yet another revolution is quickly approaching. That revolution is the wireless Internet. Today, mobile phones have become ubiquitous tools for many businesses allowing employees, customers, and suppliers to stay better connected. However, wireless voice is only the beginning. As wireless data transmission becomes possible, the Internet turns mobile. This will create entirely new disruptions in the business world as new threats and opportunities appear. Just as the Internet has become strategically important to many companies, so will the wireless Web.

Today, the Internet presents “traditional” companies many challenges. While most have begun to accept the fact that e-business is forcing a change in business models, many executives of these traditional companies are facing one of the most difficult questions—what to do with the Internet? This seems to be the real question that needs to be answered, and is the question that so many are struggling with. IBM’s Chairman and CEO, Louis Gerstner, recently spoke about a conversation he had with the chief executive of a highly regarded U.S. multinational “who admitted to [him] that he has told his executive committee: ‘Do something with the Internet—anything.’”²

The above quote conveys the desperation that is in the air. Companies are falling over themselves to cash in on the stratospheric corporate valuations brought on by the new economy, and at the same time are in a desperate battle with the same new

economy companies to keep their customers, margins, and market share. However, within five years, these same companies will be repeating their actions as the wireless Web creates a new set of opportunities and disruptions.

While panic may be a great motivator, it is not necessarily the best strategic planning tool nor is it a good reason to blindly change one's business model. Therefore, understanding why the Internet is strategically important to one's business will also help companies develop an appropriate wireless e-business strategies when that time comes. Major businesses all over the world are in a state of desperation. They are currently looking for answers to the "Internet question," and we believe that these answers will be extremely useful when the Internet goes mobile.

The purpose of this paper is to address the future of the wireless industry. As we will see, this industry is extremely complex, and is evolving every day as new players fight for control over customers. Incumbents in the industry are seeing major disruptions in their traditional value chains, which are forcing business models to adapt as quickly as the market grows. We will specifically address three manufacturers of wireless handsets—Ericsson, Nokia, and Siemens—whose products and future growth opportunities will rely heavily on not only understanding the Internet's business implications, but also on applying its efficiencies, and developing new applications to push the technology forward. These companies are in an interesting place. While they (like traditional companies) must use the Internet to improve internal efficiencies, they must also (like new economy companies) create an entirely new market based on mobile data communication.
Yet, there are still many lessons learned from the Internet that can be applied to the approaching wireless world. Because the Internet is so critical to the future of the wireless data, and it emergence has created a new set of competitive rules, we felt it necessary to first address its strategic nature. Understanding how the Internet has changed business will ultimately help companies anticipate trends created by the future wireless world.

1.1 The Information Age—New Sources of Competitive Advantage

Back in 1937, an economist by the name of Ronald Coase came up with a theory justifying the existence of firms. In *The Nature of the Firm*, Coase argued that firms existed (as opposed to individuals acting as buyers and sellers at every stage of production) to minimize transaction costs. Through economies of scale, firms are able to improve production efficiencies and reach great numbers of consumers at reduced costs. If that argument is to be believed, then it is then easy to begin to understand why the Internet is such a powerful force in today's businesses. Never before have companies (or individuals for that matter) been able to reach so many people so inexpensively and with such relative ease. The Internet has been able to improve operating efficiencies through dramatic reductions in the cost of obtaining, processing, and transmitting vast amounts information. Much of today's business relies heavily on information, and it is that very information that many successful companies have realized is the source of tremendous competitive advantage.

Many authors have argued that information actually represents a large percentage of the cost structure, even in industries not considered information

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businesses. As an example, Philip Evans and Thomas Wurster cite that “about one-third of the cost of health care in the United States (~$300 billion) is the cost of capturing, storing, and processing such information as patients’ records, physicians’ notes, test results, and insurance claims.” Information helps define relationships between buyers and sellers, determines the relative bargaining power of the players, and as a result, can be a source of competitive advantage. For example, auto dealers have for years relied heavily on asymmetric information to keep their margins high. Customers would have to actively search for competitive prices requiring a large time investment. Altering the information available would dramatically change the industry’s value chain. The Internet has caused such a dramatic change in information asymmetries and value chains almost over night.

Ironically, much of the thinking about how information provides competitive advantage has been around for some time. In 1985, Michael Porter and Victor Millar wrote an article on ways in which information provides a competitive advantage. In it they suggest that information affects competition in three ways:

1. It changes industry structure, and in so doing, alters the rules of competition.
2. It creates competitive advantage by giving companies new ways to outperform their rivals.
3. It spawns whole new businesses, often from within a company’s existing operations.

The Internet, as a source and distribution mechanism of information has certainly done all three.

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6 Ibid., p. 150.
Information's effects on corporate value chains are central to Porter and Millar's conclusions, for those who control the information will be the ultimate winners in the New Economy. Corporate value chains can be thought of as linkages of activities necessary to add value to a product or service so that it may be delivered to a subsequent buyer (another business or an end-user). These linkages require that each of the activities be coordinated within the organization. Furthermore, linkages must not only connect value-adding activities performed within the company, but also create interdependencies between its own value chain and those of its suppliers and buyers (as shown in the example of interlinked value chains in Figure 1). Information is a key element to maintaining the efficiencies between those linkages. As we will see later, this is central to the idea of many B2B businesses and e-marketplaces. The company, suppliers, and buyers can all benefit through better recognition and exploitation of such linkages.

So how does Internet affect the value chain? According to Porter and Millar, "information technology is permeating the value chain at every point, transforming the way value activities are performed and the nature of the linkages among them." Even
though, for all practical purposes, the Internet did not exist in 1985, many of the strategic issues created by the newly developing area of information technology are the same as the ones companies are facing today with the Internet—only on a massive scale.

Information is critically important to the new economy, for now more than ever before, information has the ability to diffuse instantly, and the Internet is the mechanism by which it diffuses. Below, we try to address some of the major ways in which the Internet and the availability of information is disrupting business as we know it. It is incredibly difficult to make generalizations about how a technology as diverse and encompassing as the Internet is affecting all businesses in all industries; however, we attempt to make some generalizations in an effort to help frame the problem being faced by so many companies.

We have identified seven ways in which the Internet is changing the way business is done:

1. The Internet is changing the relationship between reach and richness.
2. Existing value chains will fragment into multiple businesses, each of which will have their own sources of competitive advantage.
3. A reduction in searching costs will reduce overall switching costs forcing companies to develop new ways of generating customer loyalty.
4. Bargaining power will shift as a result of cost transparencies and a radical reduction in the ability to monopolize the control of information.
5. The Internet is making it difficult for companies to obtain high margins and is making products behave as if they were commodities.
6. The Internet is resulting in disintermediation by eliminating the middleman, usually the distributor.
7. Incumbents could easily become victims of their obsolete physical infrastructures and their own psychology.
1.1.1 *More Richness with Greater Reach*

The first thing that the Internet has been able to, according to Evans and Wurster\(^7\), has been to eliminate the traditional trade-off between “reach” and “richness,” as see in the Figure 2. Reach is simply defined as the number of people that can be connected to a company, a product, or service. Richness is a broad term that defines the information being provided, and involves aspects such as customization and interactivity. That is, highly rich information is highly customized and is interactive. Traditionally, when companies connect with one another or with its customers, the number of parties they deal with is inversely proportional to the richness of the information they exchange.

As an example, one can think of the market segmentation of newspapers. While newspapers reach thousands of people daily, they are generally not very customized (i.e. high reach, low richness), but they are customized to the extent that local newspapers provide their customers with local news that they might not get elsewhere. One could also argue that by including local information they reduce the number of people willing to subscribe to it—its reach—to local residents. While *USA Today* provides it readers with a broad array of daily stories without getting into too much detail, it is found across the United States (high reach, low richness). The *Boston Globe*, on the other hand, while really only found in the Boston area, gives its readers daily detailed updates on such the latest status of the Big Dig—something only Bostonians would be consistently interested in (low reach, high richness).

\(^7\) Evans and Wurster, Ibid., p. 73-74.
The Internet, however, is changing the nature of this relationship. Companies can now not only reach hundreds of thousands of people at almost no cost, but they can also do it in a personalized and interactive manner. Already Internet companies have taken advantage of this unique property. In 1996, Yahoo! launched My Yahoo!, a personalized Web service. Not only does it deliver personalized services such as news by topics of interest, but also offers such services as selected stock quotes, personal stock portfolio management, local and national weather and sports news, and personal favorite Web searches. The service, aggregated from multiple sources, sees over 120 million users per month worldwide.8

However, because overhead does not rise when volume rises in the Internet model, conflicts may rise between the need for scale and the need to be narrow. For example, Amazon has added music, DVD’s, toys, video games, electronics, hardware tools, and health and beauty supplies to its virtual shelves. When the company began selling toys, it did so with just a few more servers, and "went from zero to $95 million in toy sales by the last quarter of 1999."9 Ultimately, Jeff Bezos wants Amazon to be the place "where customers can find anything—with a capital A—that they might want to buy online."10 While the goal is to create a richer product and while leveraging an existing customer base is admirable, the company must do so without destroying its brand. How far companies can leverage the same brand across multiple products and services remains to be seen. Even though Amazon offers a variety of products, its name is still synonymous with books.

1.1.2 Fragmenting the Value Chain

As the trade-off between reach and richness lessens, companies like Amazon will be inclined to provide more and more products and services to their customers. However, this may create other trade-offs. As information about businesses becomes cheaper to gather and easier to read and measure, companies should be able to discern clearly which businesses are most profitable than others. As a result, companies will begin to examine their own profitability and have to determine if the profitable businesses will be willing to subsidize the less or unprofitable ones. This process of determining profitability will force companies to really understand and define their core competencies, for those who do not will see lower rates of return. In a more open commercial environment, with more transparent procurement costs and selling prices, it may also be easier to determine who outside the company is the most efficient producer, and best able to perform non-core competencies. This will result in more outsourcing of functions to the most efficient player. If a company has inefficiencies in its value chain, it is likely that competitors will arise to remove those inefficiencies.

Many companies have already recognized that they cannot do everything themselves. Cisco Systems offloads manufacturing to partners like Celestica, Dell is little more than an assembler of PC's, and "smart movers like Eastman Chemical—which is spinning off its logistics department to form ShipChem.com—will use the Net to shed inefficient cost centers and focus their efforts on genuine added value."

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1.1.3 Searching Costs Reduce Switching Costs

The wide availability of information will not only increase outsourcing through value chain fragmentation, it will also make it easier for companies to switch suppliers. As we will see later in this chapter, the fragmenting of the value chain and reduced switching costs have been two of the main driving forces for many e-business initiatives. However, because of certain industry dynamics discussed in Chapter 2, switching costs may not decrease in the wireless industry.

1.1.4 Cost Transparency Shift Bargaining Power

The ability to reach so many customers with such relative ease and the ability to provide them with very customized experiences has created other disruptions in the business environment. Indeed, by reducing search costs and increasing the flow of information, the Internet explicitly shifts power from producers to consumers. However, the real threat comes when the information allows buyers to infer sellers’ costs and determine whether they are in line with the prices being charged.

1.1.5 Reducing Margins and Products Behaving like Commodities

Both cost transparency and the ability for customers to easily switch suppliers are likely to cause a squeeze on profits. Take for example financial brokerages. Traditional full-service brokerages like Merrill Lynch traditionally charged large transaction fees for executing security trades providing them with high margins. When the first discount brokerages like Charles Schwab emerged, they lost many customers, but were still able to differentiate themselves by offering additional services. However, as on-line trading accounts like E*TRADE and Datek emerged, customers could no longer justify the high transactions costs and defected in droves. For several months
Merrill Lynch resisted offering on-line trading internally fearing it would undercut its margins. Externally they maintained that investors needed skilled human guidance when investing. By 1999 Merrill Lynch could hold out no longer and finally began to offer online trading, though it cost them dearly in time and money to develop the infrastructure and competencies necessary to provide the right customer experience. Realistically, they had little choice, considering that there will be about 5.4 million online brokerage accounts with total assets of $374 billion by the end of 1999. By 2003, Forrester expects the numbers to skyrocket to 20.4 million accounts, worth about $3 trillion.\(^{12}\)

1.1.6 Disintermediation—The Rise of the Infomediary

This was already happening in business as companies and suppliers have become more closely linked. However, because e-commerce can be so specifically tailored to the needs of buyer or seller, it has at the same time given rise to a new class of infomediaries who both find products for buyers and who find buyers for sellers.

1.1.7 Victims of Physical Assets and Legacy Psychology

Conventional investment decisions revolved around buying or building for internal use. However, this type of prudent thinking will not work in e-business networks. According to Forrester Research, “firms will instead grapple with a much broader trade-off: hoarding their resources versus sharing them with partners and customers over the network.”\(^{13}\) Those that hoard their assets will find they are at a disadvantage for several reasons. Most importantly, as switching costs decrease, businesses will have the ability

to consume best-in-class services. Those that outsource such services will be more nimble and be able to outperform companies who have chosen vertical integration. Ideas move quickly, while assets move slowly.

Large firms like DuPont and Sears are beginning to see the fallacy of reserving assets for their exclusive use. These corporations are moving into the frontier by striking equal-to-equal deals with young firms like Ventro and CommerceOne—new economy enterprises that can more effectively bring valuable offline assets into the net business environment.

The Internet is clearly changing traditional business models, and companies must be proactive to the changes being created. Even Intel has recently changed its business model because of the Internet. “The PC was at the center of computing during the 90's, but if you look at the next decade, the Internet is clearly it. The PC is still very important in the Internet era, but if you want to be involved in this new era, you have to look for the new growth opportunities.”¹⁴ And that is exactly what they are trying to do. While they are still driving their core microprocessing business, they have supplemented it with new growth initiatives in cellular communications, and server appliances that are all being driven by the growth of the Internet.

1.2 The New Economy—The Evolution of the Internet

These seven trends have directly impacted the evolution of the Internet and the ways in which companies have used it to add value to their organizations. The Internet can add value to businesses in three basic ways. First it can be used to reduce costs. Secondly, it can be used to generate revenue. Thirdly, it can be used to improve

organizational efficiency. Through our investigations, we have found that most
companies have used these three mechanisms for value creation in four evolutionary

1.2.1 Stage 1: Brochureware

For the Internet, the early majority began to appear in the early 1990’s. At the
time, there were few companies who really understood the full uses of the Internet. As
a result, the first evolutionary step for most corporate uses of the Internet was simply to
provide basic information about the company and its products and services. This
“brochure-ware” was an obvious way for companies to improve the dissemination of
information that had to be distributed. The Internet provided an essentially free
mechanism for companies to tell their customers about themselves and the products
and services they offered. However, this was merely an extension of existing business
processes, and hardly a revolutionary application.

1.2.2 Stage 2: e-Commerce—A New Revenue Generator

Companies quickly began moving along the adoption curve and began to see the
Internet as more than simply a new means of presenting information, but saw there
were new ways in which to use that information. In the second stage of the
evolutionary process, companies began viewing the Internet as another possible
distribution channel to reach its customers. No longer were customers expected to visit
to a company’s web sites solely to gather information, but instead to engage in
transactions. The Internet was now being viewed as a new mechanism to generate

14 Craig Barret, CEO of Intel Corp. from “The Thrill of ‘Clawing for Market Share’ Is Back,” BusinessWeek,
March 13, 2000, p. 124.
revenues through e-commerce—a business-to-consumer transaction. The Internet was able to provide more than a passive customer experience; it was now moving to an environment of interactivity.

However, this evolution was easier for some than others for several reasons. First, many traditional companies had existing distribution channels that they were intentionally or unintentionally circumventing by selling directly to their end users. In many cases, these distribution channels put up an incredible amount of resistance to having their suppliers sell their products over the Internet, and understandably so. By selling directly, many traditional companies would be completely cutting their distributors or retailers out of the value chain. The Internet was beginning to disintermediate distributors that in the past had added value by making it easier for other companies to reach customers. The value that these distributors and retailers provided had shriveled in a matter of months.

The Internet made these types of inefficiencies very evident, and the end result was the appearance of hundreds of e-commerce retailers. Companies such as Amazon and Travelocity were disintermediating their traditional competitors by making efficient use of this new distribution channel. The companies that were most immediately affected e-commerce were those that were inherently information businesses (banking, brokerage, publishing, music, and software), but it was a matter of time before the Internet began to redefine other industries.

They had the advantage of operating without the existence of legacy distribution channels, and could, therefore begin to remove inefficiencies out of many business-to-consumer transactions. Dell Computer has been probably the most widely cited
example of a company who used the Internet to its advantage in this way. Michael Dell, the company's founder and CEO, began selling PC's out of his college dorm room in 1984 directly to end-users. By the early 1990's the company had successfully moved to an "order-by-phone" strategy where end users continued to directly order custom built PC's from the company. As the Internet gained in popularity and companies began considering its use in generating revenues, Dell easily made the transition from taking orders over the phone to taking orders over the Internet.

Compaq, on the other hand, had given exclusive rights to dealers for sales and service of its products rather than establish a large sales force. To intensify a head-to-head battle with Dell's booming direct sales, Compaq began using the Internet to sell PCs to businesses in 1998. However, Compaq could never adequately integrate its on-line purchases while appeasing wary retailers. This strategy was ultimately reversed later the same year. In fact, to this day, Compaq is trying to beef up its direct PC sales efforts in the hopes of one day being able to take advantage of the efficiencies created by the Internet.

Compaq was not the only company to experience these problems. In fact, most traditional companies (such as Procter & Gamble, Wal-Mart, Ford, and IBM, just to name a few) faced many similar problems. It was at this time that traditional companies began to understand the threat posed by new economy companies.

Another reason many companies had difficulty in creating successful e-commerce initiatives was they simply did not have the infrastructure necessary to make full use of its efficiencies. For example, it was not uncommon for many companies to set up e-commerce initiatives selling their products to customers without linking it to
their back-end order entry systems. As a result, when an order was placed, someone
would have to manually enter the information the customer had already entered. This
system provided little cost savings if any, and was no better than having orders faxed in.

General Electric is one example of a company who has been seeking to increase
online transactions and better link its many disparate businesses, and has aggressively
pursued e-commerce for the past 18 months. While many analysts say that while GE
lags behind some cutting edge technology companies, it leads many older-line
manufacturing concerns in bringing e-commerce into its fold.

In its 20 major businesses, GE makes and sells everything from lighting fixtures
and medical X-ray machines to small business loans and industrial plastics. While its
customers include single homeowners, large hospitals, retail chains, and huge
corporations, about 85% or its transactions are with businesses. Consequently, the
revamped GE.com is designated to act less like a corporate web site and more like an
Internet portal which customers can use to access an extended network of sites
maintained by the myriad of GE units. Most GE products, from individual loans to entire
power generators will be available for purchase online. However, not everything has
been easy. Some consumer goods, like appliances, cannot be purchased directly
online from GE. Because the company is also a supplier, it too is trying to manage its
distributors not wanting to disintermediate its retail customer like Sears & Roebuck.
One way in which they are doing this is by providing links to merchants that sell their
appliances online on the GE website.
1.2.3 Stage 3: e-Business—“EDI on Steroids”

As companies began to flirt with revenue generation through e-commerce, many began to see the need to reduce costs and improve operating efficiencies. Whereas the e-commerce initiatives were largely customer focused, new e-business initiatives were more focused on internally. Companies now needed to begin linking transactions performed over the Web into existing ERP systems. Furthermore, they saw the potential of sharing that information with their suppliers in an effort to streamline the entire value chain. Such concepts have been around for many years, mainly in the form of electronic data interchanges (EDIs).

EDI employed arcane computer language to link buyers and suppliers through an expensive complex of business translators and proprietary networks. These systems helped giant buyers like General Motors and Sears and Roebuck transact business electronically with their suppliers by translating orders into formats that back-office business applications understood. However, these systems were both expensive and complex making them practically out of reach to all but the largest suppliers. The Web on the other hand has provided an open standard for companies to communicate with each other making it cost effective for Mom & Pop shops to supply to such giants.

E-business gave all companies the opportunity to take advantage of improved business process efficiencies by linking back-end supply management with front-end consumer demand. These types of systems promised to reduce inventory, improve delivery performance, and match supply with demand.

The move from e-commerce to e-business made many corporations realize that a great-looking site wasn’t enough anymore. Firms would have to link their core
systems to the Web. In the process, companies would have to drive Web technology deep into the infrastructure, transforming customer service, supplier management, and even the product, itself. Table 1 below provides some general differences between e-commerce and e-business.

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<th>B2C</th>
<th>B2B</th>
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<tr>
<td><strong>Switching Costs</strong></td>
<td>Low with multiple suppliers</td>
<td>High when integrated with e-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>infrastructure; few qualified suppliers</td>
</tr>
<tr>
<td><strong>Relationship Type</strong></td>
<td>Transactional</td>
<td>Long-term; mission critical; relationship based</td>
</tr>
<tr>
<td><strong>Transaction Type</strong></td>
<td>Smaller average selling price</td>
<td>Larger average selling price</td>
</tr>
<tr>
<td><strong>Revenue Model</strong></td>
<td>Traffic volume is critical; large</td>
<td>Don’t need all customers, only the</td>
</tr>
<tr>
<td></td>
<td>customer base is key</td>
<td>right customers</td>
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</table>

Table 1

A good example of this is Cisco. A single vendor tends to seek many buyers. Its aim is to create or retain value and market power in any transaction. As one of the role models, the Web site set up by Cisco Systems enables buyers to configure their own routers. In addition, customers can check lead times, prices, order and shipping status, and confer with technical experts. The site is responsible for $3 billion in sales a year amounting to about 40 percent of the company’s total revenue. Furthermore, by publishing technical documents on line and giving customers access to order information, Cisco saves between $260 and $300 million annually in printing expenses, order and configuration errors, and telephone-based customer support. Speeding up ordering and order status checking leads to increased customer loyalty that can be translated into a perpetuity of recurring revenue streams.

The catalysts that have driven B2B adoption by the early majority are clear:

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1. Increased Experience with Web Technologies—As companies and individuals become more familiar with Web technologies, they will put up less resistance to implement new applications.
2. Consolidation of Industry Standards—Standards like XML allow companies to better share information.
3. Simplification of Applications—During the last several years, e-commerce companies have had to internally build their commerce solutions. Recently, standards have evolved that enable companies to purchase customized applications that address those needs.
4. Increased Stickiness in B2B Applications (i.e. Network effects)—As more people engage in B2B applications, the applications become more attractive to others not using them.
5. Cost Savings from Large-Scale Implementations—Cost savings are an important driver in information technology. Those cost efficiencies delivered by e-business can lead to demonstrable returns on investment.

As more and more B2B applications have arisen over the past several months, we have seen several revenue models. Table 2 lists some of the most common forms of revenue streams and some of the most basic forms of B2B revenue models.

<table>
<thead>
<tr>
<th>B2B Revenue Streams</th>
<th>B2B Revenue Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Advertising</td>
<td>1. Transactions (Buying &amp; Selling)</td>
</tr>
<tr>
<td>2. Auctioning</td>
<td>2. Auction Driven Commissions</td>
</tr>
<tr>
<td>3. Procurement</td>
<td>3. Software Licensing</td>
</tr>
<tr>
<td>4. e-Commerce</td>
<td>4. Cost Savings Compensation</td>
</tr>
<tr>
<td></td>
<td>5. Advertising Fees</td>
</tr>
<tr>
<td></td>
<td>6. Content Subscriptions</td>
</tr>
</tbody>
</table>

Table 2

However, there are risks involved with many B2B applications:

1. Skepticism remains about ROI
2. Slow technology adoption
3. Security issues
4. Industry perception of B2B as a threat
5. Reluctance limits adoption
1.2.4 Stage 4: e-Marketplaces

Over the past several months, we have seen yet another transformation of Internet business models. Where as many original B2B businesses began by linking the purchasing of one business to the sales of another, the emergence of e-marketplaces has created a many to many relationship. The basis for such e-marketplaces or B2B exchanges is the building of these relationships. Prior to the existence of e-markets, large buyer businesses had one-on-one relationships with other seller businesses using EDI or other mechanisms. As we discussed earlier, these relationships were primarily focused on direct materials and production goods, and small and medium-sized businesses were largely excluded because of the costs involved in doing business electronically.

With e-markets and their aggregation of community, content, and commerce as well as the low cost of Web-enabled entry, small and medium-sized businesses are able to gain crucial access to a broader marketplace for selling and/or buying goods and services. In fact, we believe that the main driver for e-markets will be smaller businesses that collectively create economies of scale as well as give the e-market clout in negotiating availability and delivery of value-added services such as content, credit/financing, and shipping. Thus e-markets will facilitate interaction between small buyers and large suppliers, large buyers and small suppliers, as well as small buyers and small suppliers.

We have already beginning to see that large companies cannot afford to ignore the e-markets and have been not only joining them, but forming their own. By April of
2000, there were more than 1,700 such business-to-business exchanges.\textsuperscript{16} Just a few examples include:

<table>
<thead>
<tr>
<th>Industry</th>
<th>Name</th>
<th>Sampling of Participants</th>
<th>Date Announced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
<td>MetalSite</td>
<td>Weirton and Bethlehem Steel</td>
<td>Aug. 19, 1998</td>
</tr>
<tr>
<td>Automobile</td>
<td>To Be Announced</td>
<td>Ford, General Motors, DaimlerChrysler</td>
<td>Feb. 25, 2000</td>
</tr>
<tr>
<td>Retail</td>
<td>GlobalNetXchange</td>
<td>Sears and Carrefour</td>
<td>Feb. 28, 2000</td>
</tr>
<tr>
<td>Farming</td>
<td>Rooster.com</td>
<td>Cargill, DuPont, and Cenex</td>
<td>Mar. 1, 2000</td>
</tr>
<tr>
<td>Consumer Products</td>
<td>To Be Announced</td>
<td>Procter &amp; Gamble, Nestle, and H.J. Heinz</td>
<td>Mar. 15, 2000</td>
</tr>
<tr>
<td>Paper</td>
<td>To Be Announced</td>
<td>International Paper, Georgia-Pacific, and Weyerhaeuser</td>
<td>Mar. 23, 2000</td>
</tr>
<tr>
<td>Medical Products</td>
<td>To Be Announced</td>
<td>Johnson &amp; Johnson, Medtronic, Abbott Laboratories</td>
<td>Mar. 29, 2000</td>
</tr>
<tr>
<td>Retail</td>
<td>WorldWide Retail Exchange</td>
<td>K-Mart, Target, Tesco, and Safeway</td>
<td>Mar. 31, 2000</td>
</tr>
</tbody>
</table>

From extranets to e-Marketplaces, the Net makes sense as a business channel. Extranets give firms the same control over branding, pricing, positioning, and information flow as offline channels did, but e-Marketplaces burst the extranet bubble. These hubs will transform fragmented industries into liquid markets, putting customer ownership, brand loyalty, and partnerships at risk.

1.3 Valuation effects

The entry of more and more e-retailers, like Dell and Amazon.com into established consumer markets created other problems for traditional companies, particularly in the capital markets. Some have referred to this as the "valuation paradox."\textsuperscript{17} During this time, new economy companies paid no penalty in the stock market for the losses they incurred in building their e-commerce businesses. The high

\textsuperscript{17} Merrill Lynch, \textit{e-Commerce: Virtually Here—A Special Report}, April 1999, p. 8.
valuations that many saw gave them an unusually low cost of capital. They used this to their advantage by returning to the equity markets for additional funds that they used on marketing campaigns, new technologies, or even to purchase other companies.

While new e-commerce and e-business companies saw tremendous valuation growth, traditional companies (i.e. brick and mortar companies) saw little growth over the same period. Furthermore, many were penalized with shrinking multiples for their losses in starting up e-commerce businesses. The reasons for this were many.

First, investors saw that these new economy companies had the potential to take significant market share away from their traditional counterparts at relatively little cost. Secondly, investors recognized that the traditional companies who making investments in Internet technologies and infrastructure were ultimately going to be cannibalizing their own businesses. This would ultimately result in higher expenses and lower revenues. The practical effect was an increase in their cost of capital, making it more expensive for them to pursue Internet strategies. This made it even more important for these companies to find viable e-commerce business models.

The study shown at the right in Figure 3 justifies some of these valuation effects. The outcome of the study on the below\(^\text{18}\) is based upon stocks of companies that changed their

\[\text{Value of Clicks and Mortar}\]

![Adding "Clicks" Increases Access to Capital Markets](image)

**Figure 3**

(Merrill Lynch clients may access a copy of this report at: http://www.research.ml.com.)

names from January 1998 through March 26, 1999. It reveals rather dramatically the stock price performance of companies that changed their names to include Web-oriented designations like ".com" from 30 trading days before the name-change announcement to 30 days after.

We conclude that this another key driver for companies to move faster towards turning their company into an e-company build around a solid Internet foundation. Particularly, we think that the distinctive element of a forward-looking defense strategy comes into play again. Just the pure effect of a two-fold increase of the market capitalization is a massive hurdle for any takeover attempts of competitors or complementary moves of Internet companies (e.g. AOL/TimeWarner).

The inherent increase of shareholder value will certainly retain institutional and private investors, and in addition add new equity investors to the club of owners.

Siemens is a good example that demonstrates the points made. For years the stock price of the company was highly undervalued and in the focus of interest of moderate and highly risk oriented investors. With the announcement of the 10-point program and the successive commitment of the launch of the mobile division and others like the e-business and Services initiative, the stock of Siemens skyrocketed to

Figure 4

-52-Week Range: € 53-144 Year
Shrs Out (MM): 595.0
P/E 45.6
Market Cap (MM): € 85,085
all time heights (Figure 4). Besides the overall high stock market performance a major portion of this 2-fold increase can be attributed to the change of directions at Siemens.

In addition we see at high valued companies like within our three companies a winner syndrome. The employees are revived to commit to above the norm outputs, the analysts community turns its negative judgments into endorsing comments and companies seem to be able to implement with less resistance from outside even unfavorable measurements like divestitures of business lines.

Specifically for the implementation of e-business strategies this supports the change of directions. At least a temporarily time period, the distracting pressure from internal and external influences can be reduced.

1.4 Future Trends

A recent survey of 500 large companies carried out jointly by the Economist Intelligence Unit (a sister company of The Economist) and Booz Allen and Hamilton found that “more than 90% of top managers believe the Internet will transform or have a big impact on the global marketplace by 2001.”19

We have discussed many of the reasons, we believe, the Internet will change business. However, there are more still disruptions to come. Below are six trends of the next revolution:

1. The “convergence” of B2B and B2C markets
2. Dynamic pricing & negotiation
3. The human resource crunch intensifies
4. Development of “always-on” Internet services
5. The return of voice
6. Mobility20

20 Partially derived from a presentation given by Tom Ilube, Managing Director of LostWax.com, on March 16, 2000.
The six trends above will not only shape the future of the business, but also shape the ways in which companies and individuals use the Internet. The first is the convergence of B2B and B2C markets. As we have discussed, the Internet have seen an evolution from a business-to-consumer focus to a business-to-business focus. This trend has been further emphasized by the emergence of e-markets. However, there is still one area that companies must still integrate—front-end e-commerce with back-end e-business. By linking customers and suppliers and creating seamless interfaces between them, companies can greatly improve the sharing of information and overall efficiencies within their own organizations and with their suppliers. Again, Dell provides one of the best examples, as customer orders placed over the Internet automatically flow directly to their suppliers' IT purchasing systems specifying part numbers and delivery specifications. This type of efficiency has allowed Dell to not only dramatically reduce its turnaround time, but also slash its inventory thereby minimizing costs associated with obsolescence.

Second, the Internet's ability to create opportunities like e-market exchanges will encourage the use of dynamic pricing and negotiation. Upon closer inspection, many of the exchanges are business applications of on-line auction sites like E-Bay. Dynamic pricing will work best for products and services that can be easily differentiated and specified. This applies for the most part to commodities—the more commoditized the product, the more feasible dynamic pricing becomes. Companies will try to differentiate their products so as not to compete solely on price. While the use of dynamic pricing may not be possible for all types of products or services, we believe that it will become increasingly popular in industries where buyers have significant bargaining power.
Third, the Internet is creating an increasing demand for highly skilled individuals. Companies must react quickly to business opportunities and must have the human resources available to capitalize on them. As a result, many of these companies are offering significant opportunities for personal reward. However, this human resource crunch is creating an additional, unanticipated problem. The risk for many of these new ventures is high, and in order to guarantee success, these companies want to attract the best individuals. Those looking to join are also concerned about the company’s success, and will tend to only join those companies who have the best team to make the company successful. As a result, the companies with the highest probability for success will attract the best individuals in a self-reinforcing cycle. This will ultimately leave “B-player” working for “B-organizations.” This creates a large challenge for traditional companies who, by not acting quickly to Internet and other growth opportunities, are losing talented people to such start-up ventures. With its C.E.O., and many other top-level managers leaving for Internet start-ups within the past year, AT&T is a perfect example of the mass exodus that is occurring.

We feel that the next three future trends are particularly important, because together, they will form the basis for what will be the rise of the next disruptive business opportunity—the mobile Internet. For reasons we will discuss, the mobile Internet will have just as profound effect on business as the wired Internet has had over the past five years. The first is the increasing demand of “always-on” Internet services. Both businesses and consumers are increasingly demanding of constant connections, and for many companies an always-on connection is a prerequisite for conducting business. Constant connections will create opportunities for new consumer and business
applications that would be not possible or, at best, inconvenient using dial-up connections. The second trend is the return of voice to the Internet. There is a distinct convergence of voice and data services being delivered by both telecommunications companies, and Internet service providers. That convergence will continue as the human voice is a key element of any interactive proposition. Last, is the trend towards mobility.

Over the past five years, the Internet has created business opportunities for many start-ups, and at the same time, threatened many traditional business models. The Internet, e-commerce, and e-business have essentially invaded public consciousness and the media as part of a technical revolution that will dramatically change society. However, another revolution is gaining strength that will create its own opportunities and threats. The wireless Web will be just as disruptive, if not more, as the Internet has been. For some companies, it will create new opportunities for reducing costs and improving internal efficiencies, and for others it will make completely new business models possible. Where the Internet affected how we interacted, the wireless Internet will change where we interact. Both consumers and businesses will feel the effects as e-commerce and e-business become m-commerce and m-business.

The wireless Web is where the wired Internet was in 1995. Connections are slow, content is sparse, and applications are just beginning to be defined. A myriad of companies, however, are springing up to deliver services and content to wireless devices. As was the case with the emergence of the Internet, these new players are causing immediate disruptions in closely related businesses (like the handset manufacturers, and network operators) as they fight for control of the customers.
Eventually, these new players will begin to affect companies in seemingly unrelated vertical industries as more begin to recognize the value created; though this will not happen until industry specific applications become available. We are currently seeing this happen in today's Internet as companies like Ariba and VerticalNet disrupt almost every existing traditional vertical market from the airline industry to the health care industry by creating on-line buyer-supplier exchanges.

The combination of an always-on Internet connection, the use of voice, and the ability for mobility is the basis for the mobile Internet, and it is the foundation on which Nokia, Ericsson, and Siemens are building their future.
CHAPTER 2: Wireless Handset Industry Overview

The mobile telecommunications industry is in a dramatic state of flux. Not only are terminal manufacturers like Nokia, Ericsson, and Siemens seeing exponential growth in mobile voice communications, but are also now beginning to grapple with the issues of data delivery over mobile devices. These next generation mobile devices will not only have to deliver voice services, but will also have to deliver data services such as email, e-commerce, and other Internet applications. Furthermore, the convergence of handheld and wireless devices, a multitude of standards, governmental deregulation, and the consolidation of industry players are adding to an already competitive and complicated industry. This chapter will provide an overview of the mobile telecommunications industry, discuss the evolution of the industry's technological state, and address the competitive threats being faced by mobile telecommunications handset manufacturers.

2.1 Industry Overview

The mobile handset market has been growing exponentially over the past few years, and it is expected to continue to do so. As shown in Figure 5, the number of phone subscribers worldwide is expected to reach nearly 600 million

Source: Nokia presentation given to MIT's Management of Technology class on March 24, 2000 at their corporate offices.

Figure 5
by 2002—up from 194 in 1997.\textsuperscript{21} This growth is mainly being largely driven by the overwhelming popularity of flat rate pricing plans, like AT&T's Digital One Rate; improved quality, capacity, and features; and most importantly, the ability to be constantly connected. As shown in Figure 6, Nokia is the leader in the handset market with 27% market share. Over the past several years, it has surged past Motorola as GSM became the European standard. However, new entrants like Samsung are beginning to change the competitive environment. We will take a closer look at these issues later in this chapter and in Chapter 5, when we discuss Siemens, who is entering as a market attacker.

While sales of mobile devices are expected to continue with exponential growth, the handset manufacturing industry will be dramatically different in a few years time. This industry disruption will change the competitive landscape, and force incumbent handset manufacturers such as Ericsson, Nokia, and Siemens to critically review their strategic focus if they are to remain top players in the industry.

Today, the mobile handset manufacturing and telecommunications industries are being shaped by four forces (Figure 7). The first is the increasing use of the Internet and Internet Protocol (IP) to deliver new consumer and business services. With some 108 million people sending some 7 trillion messages a year by the end of 2000ites

\textsuperscript{21} "Up in the Air," \emph{Red Herring}, April 2000; and a presentation given by Ericsson to MIT's Management of Technology Class on March 22, 2000.
application like e-mail have become pervasive among businesses and consumers alike. Additional services such as e-commerce (business-to-consumer) and e-business (business-to-business) will continue to make the Internet an invaluable tool. By the year 2004, e-commerce and e-business trade will amount to a total of $6.9 trillion accounting for 8.6% of all global sales of goods and services.\textsuperscript{23} e-Commerce and e-business could also have a big impact on prices. It is estimated that that B2B e-commerce could reduce average prices in the world's five wealthy economies by almost 4\%.\textsuperscript{24}

The second force shaping the industry is the increasing desire for businesses and consumers to access these services in a mobile environment. Industry experts expect the number of wireless devices to explode over the next three years, and as more people begin using these devices, more will do so to access the Internet.

"International Data Corporation, a market research firm, estimates that nearly 62 million people will use wireless devices to access the Internet by 2003—an increase of about

\textsuperscript{23} Matthew Sanders, "Global eCommerce Approaches Hypergrowth," \textit{The Forrester Brief}, April 18, 2000.
\textsuperscript{24} "Internet Economics," \textit{The Economist}, April 1, 2000, p. 65.
728 percent over current levels.\textsuperscript{25} Already European mobile customers have taken to short messaging services (SMS), which allows them to send and receive short text messages using their mobile phones. Deutsche Telekom, the largest wireless operator in Europe, sometimes handles up to 5,000 messages per second.\textsuperscript{26}

Mobile communication will also dramatically alter the way companies work with customers and partners—similar to the manner in which the Internet has already altered the business environment. For example, today brokerage services are disconnected from their customers as soon as they log off their PC’s. With mobile devices, brokerages will be able to maintain contact with their customers 24 hours a day. Issuing alerts will help them drive customer transactions. Other companies are already finding value in such services. Both Sears service professionals and MCI technicians use wireless handheld devices to download the next day’s jobs, and retrieve work orders. The ultimate benefits will come in strengthening customer relations and in cost savings generated through efficiencies.

The third force is the convergence of not only voice and data over mobile devices, but also the convergence of mobile devices themselves. Most business professionals travel with more than their fair share of portable devices: laptops, mobile phones, and personal data assistants (PDAs). Add entertainment devices such as portable CD players and the plugs and converters needed when traveling abroad, and one begins to question the notion of portability. Today, mobile communication is, for the most part, synonymous with the cellular phone. However, future mobile devices will combine all of the capabilities of many of today’s portable devices in a single device,

and additional functionality not currently available will be provided from mobile
connectivity to the Internet. For example, one could leave CDs at home and dial up the
Internet to download songs directly to an MP3 player while waiting at a bus stop. Future
devices will support applications such as mobile video conferencing or even global
positioning, all from the same device.

Even more intriguing are the possibilities for "dumb" devices with wireless access
based on technologies like Bluetooth. For example, a coffee maker fitted with wireless
communication capabilities could phone an alarm clock informing it that the morning's
coffee is ready. A refrigerator could be alerted to its contents exceeding perishable
dates, and forward that information to the shopping list of mobile devices or to grocery
service providers such as Streamline, Webvan, or Home-runs. In the future, the mobile
device need not be a phone.

The fourth force shaping the mobile device industry is the consolidation of
industry standards and industry players. This will be primarily driven by the
convergence of voice and data, and the convergence in devices. As seen with the
Internet revolution, the mobile data access will create new business models and new
sources of competitive advantage. Mobile handset manufacturers will have to move
quickly and carefully in this environment as they fight with mobile service providers,
wireless portals, Internet portals, Internet service providers, entertainment companies,
consumer electronic companies, and application providers (among others) to gain
control over the customer. It is currently unclear which of these companies will have
final direct access to the customer. The boundaries of the products and services
offered by these various industries will also begin to blur as Internet service providers and banks begin offering wireless services in a new deregulated environment.

This competitive environment is further complicated by ever evolving fight for radio frequency and transmission protocol standards. The hope is, however, that partnerships such as Symbian, a coalition of some of the world’s largest mobile telecommunications companies (Ericsson, Nokia, Motorola, Matsushita (Panasonic), and Psion), will help set these standards.

While these forces are creating a dynamic and highly competitive industry, they are macro trends. There are additional underlying assumptions built into the future describe above. That future is heavily reliant on three key network developments that are far from certain:

2. Always-on, packet-switched connections.
3. Transparent, inter-device connectivity.\(^{27}\)

First, in order to provide a global, mobile communications system capable of transmitting voice and data over airwaves, network operators will have to increase their bandwidth over 200 times current 9.6 Kbps speeds. Dubbed third-generation (3G) wireless, these networks will give mobile users ISDN-like performance with data rates anywhere from 56 Kbps (typical of most dial up PC modems) to 2 Mbps.

Second, mobile networks must move from current circuit-switched connections to packet-switched connections. Packet-switched networks route small packets of data through the network based on destination address information contained in the packet. This type of communication between sender and receiver, known as connectionless (as

opposed to dedicated), is common to Internet traffic. Breaking communication down into packets allows the same data path to be shared among many users in the network at the same time. It allows a user to be connected at all times without locking out others (like dedicated circuit-switched networks do). Voice calls using the Internet’s packet-switched system are possible. Each end of the conversation is broken down into packets that are reassembled at the other end. Packet-switching technologies makes efficient use of network capacity making data transport up to 70% cheaper than circuit-switching technologies.\textsuperscript{28} The hope is that savings will be passed down to users reducing the cost of mobile communications.

Third, interdevice connectivity is essential to a globally compatible mobile network. A universal standard for devices will reduce customer lock-in and make for a more competitive environment. Technologies like Bluetooth are helping this standardization process. Bluetooth is a short-range wireless networking specification being developed by an alliance of 3Com, Ericsson, Nokia, Motorola, Lucent, Microsoft, IBM, and others. More than 1,500 technology companies currently back it. Using radio waves, Bluetooth-enabled devices, such as PCs, phones, PDAs, printers, and other peripherals, will be able to communicate with each other. Unlike infrared technology, Bluetooth does not require line-of-site between the devices.

2.2 Reading Alphabet Soup—Making Sense of Wireless Technologies

It is the hope of mobile service providers and many companies that third generation wireless (3G) will deliver on all three. 3G follows on the heels of two previous generations: 1G, an analog technology, and 2G, the current state of digital

\textsuperscript{28} Lars Godell, "Mobile's High-Speed Hurdles," Ibid.
cellular. (See Table 3.) The first generation commercial networks appeared throughout the world in the early to mid 1980's. There were three primary first generation networks, all of which were analogue. Analog cellular phones work like an FM radio. The receiver and transmitter are tuned to the same frequency, and the voice transmitted is varied within a small band to create a pattern. The receiver reconstructs, amplifies and sends the signal to a speaker. The big drawback of analog, though, was that the number of channels that could be used was limitation. Furthermore, analog signals cannot be compressed and manipulated as easily as true digital signals. This forced mobile operators like Sprint and AT&T to install more expensive cellular towers to accommodate a growing number of customers. The answer to this problem was a move to second-generation (2G) digital networks.

Currently three 2G digital wireless telephone technologies exist: TDMA, CDMA, and GSM. These digital technologies make use of compression techniques to increase the capacity per channel. The basis for TDMA is to divide conversations using the same cell to into discrete time slots, as seen in Figure 8. Each conversation essentially gets the radio for exactly one-third of the time. The bursts of information sent by the network are then reassembled at the receiving end.
CDMA (Code Division Multiple Access shown in Figure 9), on the other hand, takes the entire allocated frequency range for a given service and multiplexes information for all users across the spectrum range at the same time. Messages are encoded using a pseudo-random sequence. This encoding creates different communication channels, which are known and decoded by the receiver.

Multiple calls can be laid over one another on the channel, each assigned with a unique sequence code. While more complicated than TDMA, CDMA offers superior sound quality. The end result in either case is that a digital channel therefore has three (in the U.S., and eight in Europe) times the capacity of an analog channel.

Global System for Mobile Communication (GSM) is a European standard developed by Nokia. In fact, the air interface is an older TDMA version. What sets GSM apart is that the entire network architecture has become a standard for most of Europe and much of Asia. That standardization has allowed European service operators to quickly setup networks and deliver services to their customers. Cell phone penetration is more than 60% in Scandinavia, with more than 90% coverage.\(^{29}\) The concept is the simple use of one handset to make calls anywhere, nationally and

internationally. The network supports this through a sophisticated, intelligent network and the Subscriber Identity Module (SIM) card in the phone.

While digital cellular was a great improvement for both the service operators and their customers, the proliferation of standards has caused its own problems, especially in the United States. Operators in the United States never standardized, and each ended up using its own system, some using Qualcomm’s CDMA, some using AT&T’s TDMA, and some even using Europe’s GSM. To make things easier on the end user, the competing technologies were categorized under the general marketing term, Personal Communications Service (or PCS) that stood for a variety of two-way digital wireless service offerings operating at 1900 MHz. For example, Sprint currently uses CDMA as the technology for their PCS, while OmniPoint uses GSM, and AT&T uses TDMA. PCS services have included next generation wireless phone and communication services, wireless local loop, inexpensive walk-around communications service with lightweight, low-powered handsets, in-building cordless voice services for business, in-building wireless LAN service for business, enhanced paging services, as well as wireless services integrated with wired networks.30

The end result has been that each service provider has had to install its own network creating slow rollouts of mobile services in the United States with poor coverage. And just to be different, the United States operate their PCS/GSM networks at 1900 MHz, while Europe uses the 1800 MHz band, creating more incompatibilities.

However, it is hoped that all that is about to change with the evolution to 3G. To date, 3G is little more than a marketing term used by handset makers and wireless

30 http://www.whatis.com/
carriers to describe the convergence of voice services with data services like e-mail, Internet access, and e-commerce conducted via wireless devices. There are three main drivers for 3G: strained network capacity, high speed wireless data communication, and global standardization.

First, more so in Europe and Japan than in the United States, current 2G networks are approaching their breaking points. As one business services company put it, "I'd like to be proved wrong, but the GSM networks are already so congested that I think everything will collapse . . . . Here in the U.K. even voice calls drop off."31 Secondly, today's 2G systems are optimized for voice, not data. 3G will not only allow network operators to provide data transfer rates of up to 2 Mbps, but it will also allow them to offer value added services. This is very important since, at 10 cents per minute or less, voice services are already commoditized. Third, 3G systems promise users the ability to use their mobile devices globally because of universal standardization. This means that an American traveling in Europe or Asia will be able to send and receive phone calls and data on his or her existing mobile device, and vice versa—something that is virtually impossible today.

2.3 The Rocky Road to 3G

However, the move to 3G may not be as easy as everyone anticipates. There are two main reasons for this. The first is possibility of yet another proliferation of different standards. Network operators in Europe, the United States, and Japan each have different existing infrastructure. However, depending on the standard used for the third generation, some existing networks would be easier to upgrade than others. As a result, each country has been pushing for a 3G standard that would minimize the
transition pain from different existing networks. In May of 1999 the Operators' Harmonization Group, a consortium representing thirteen of the world's largest telecommunications companies, released plans for a globally harmonized third-generation CDMA radio standard. According to the plan, there will be three—not one—modes in the harmonized 3G CDMA standard: a direct-sequence mode for WCDMA (Wideband CDMA), a multi-carrier mode for CDMA2000 (an evolution of narrowband CDMA), and a time division duplex (TDD) CDMA.

Making the situation seem even more hopeless, Japan is in the process of implementing their own 3G network, even thought the standards mentioned above are still in a state of flux. This has been brought on largely from a strain on the country’s existing capacity. It is certainly reasonable that the U.S. and Europe might modify the standards before implementation begins. By moving forward before the standards are finalized, though, they decrease the likelihood of a truly global network.

The second reason the path to 3G may be rocky is that it may not be immediately economically viable for the network operators. Upgrading to 3G will be incredibly capital intensive, and it is the network operators who will bear the costs of removing existing and installing the new network. Some estimates suggest that it will cost as much as $248 billion to implement the new 3G networks worldwide.\(^{32}\) (That does not include the licensing rights to the radio frequencies, which the British government just auctioned off to five telcos for over 22.5 billion pounds—approximately $35 billion.)

Aside from cost, there are the issues of content and device availability. Currently, neither a WAP (Wireless Application Protocol) application, nor a wireless

\(^{31}\) Lars Godell, “Mobile’s High-Speed Hurdles,” Ibid.
device exists that require the 2 Mbps connection offered by 3G. In for most existing applications, 64 Kbps—just faster than most state of the art PC modems—is more than sufficient for content to be displayed on a handheld device. As a result, may network operators are taking an interim step, 2.5G.

Currently, several 2.5G technologies exist. They are, in general, less expensive, use existing legacy hardware, and can transport voice and data at greater speeds than second-generation mobile networks. Some of the leading 2.5G technologies include EDGE (Enhanced Data rates for GSM Evolution), GPRS (General Packet Radio Service), HCSD (High-Speed Circuit Switched Data), and CDMA2000 Phase I. For the most part, these are software upgrades to existing networks as opposed to full hardware upgrades, hence the significant difference in cost. In the end, these problems could mean not only a serious delay for the G3 rollout, but also a global network that is less than global.
<table>
<thead>
<tr>
<th>Generation</th>
<th>Core Technology</th>
<th>Service</th>
<th>Bandwidth (Kbps)</th>
<th>Features</th>
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<tr>
<td>1G</td>
<td>AMPS/NAMPS</td>
<td>Narrow Band Advanced Mobile System</td>
<td>9.6</td>
<td>• Analog voice service</td>
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<td></td>
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<td>• No data capabilities</td>
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<td></td>
<td>TACS</td>
<td>Total Access Communication System</td>
<td>9.6</td>
<td>• Analog voice service</td>
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<td></td>
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<td>• No data capabilities</td>
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<td></td>
<td>NMT</td>
<td>Nordic Mobile Telephony</td>
<td>9.6</td>
<td>• Analog voice service</td>
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<td></td>
<td>• No data capabilities</td>
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<tr>
<td>2G</td>
<td>GSM</td>
<td>Global System for Mobile Communication</td>
<td>9.6-14.4</td>
<td>• Digital voice service</td>
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<td></td>
<td>• Advanced messaging</td>
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<td>• Global roaming</td>
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<td>• Circuit-switched data</td>
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<td>2.5 G</td>
<td>CDMA</td>
<td>Code Division Multiple Access</td>
<td>9.6-14.4</td>
<td>• Digital voice service</td>
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<td>• Advanced messaging</td>
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<td>• Circuit-switched data</td>
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<td>TDMA</td>
<td>Time Division Multiple Access</td>
<td>9.6-14.4</td>
<td>• Digital voice service</td>
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<td>• Advanced messaging</td>
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<td>• Global roaming</td>
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<td></td>
<td>• Circuit-switched data</td>
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<td>HSCSD (Extension of GSM)</td>
<td>High Speed Circuit Switched Data</td>
<td>9.6-57.6</td>
<td>• Extension of GSM</td>
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<td></td>
<td></td>
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<td>• Higher data speeds</td>
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<td></td>
<td>GPRS (Extension of GSM)</td>
<td>General Packet Radio Service</td>
<td>64-384</td>
<td>• Extension of GSM</td>
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<td></td>
<td></td>
<td>• Always-on connectivity</td>
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<td>• Packet-switched data</td>
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<tr>
<td></td>
<td>EDGE (Extension of GSM or TDMA)</td>
<td>Enhanced Data Rate for GSM Evolution</td>
<td>64-384</td>
<td>• Extension of GSM</td>
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<td></td>
<td></td>
<td>• Always-on connectivity</td>
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<td></td>
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<td></td>
<td></td>
<td>• Faster than GPRS</td>
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<tr>
<td></td>
<td>CDMA2000-1XRTT (Phase I)</td>
<td>Code Division Multiple Access 2000- Phase I</td>
<td>14.4-144</td>
<td>• Extension of CDMA</td>
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<td>• Always-on connectivity</td>
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<td></td>
<td>• Faster than CDMA</td>
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<tr>
<td></td>
<td>TDD CDMA (Implements aspects of TDMA &amp; CDMA)</td>
<td>Time Division Duplex CDMA</td>
<td>64-2,000</td>
<td>• Always-on connectivity</td>
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<td></td>
<td></td>
<td>• Global roaming</td>
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<td></td>
<td>• IP-enabled</td>
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<tr>
<td>3G</td>
<td>WCDMA (Extension of CDMA)</td>
<td>Wideband Code Division Multiple Access</td>
<td>64-2,000</td>
<td>• Always-on connectivity</td>
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<td>• IP-enabled</td>
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<tr>
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<td>CDMA2000-3XRTT (Phase II)</td>
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<td>• IP-enabled</td>
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Table 3
2.4 Understanding the Value Chain

Before performing a competitive analysis of the mobile handset manufacturers, it is important to understand the current state of the value chain. As seen in Figure 10 below, the value chain for today's mobile handset manufacturers is fairly complicated.

![Value Chain Diagram](image)

Figure 10
Beginning with at the back end, mobile device manufacturers outsource most of the component parts to their handsets. In the end handset device manufacturers are more assemblers than manufacturers. As companies like Ericsson or Nokia design new devices, they work closely with the component manufacturers to come up with
appropriate chip, antenna, battery, and casing designs. Such a close working relationship is important to insure all components work together seamlessly as one. Once new products have been designed, handset manufacturers must continue to work closely with suppliers to insure a steady and reliable supply of parts for manufacturing. Both Ericsson and Nokia have made significant efforts to institute EDI-like systems to reduce inventory and improve overall supply chain management based on end user demand. Such market-focused product supply chain management and resource coordination have reduced lead times at Ericsson from between 120 and 60 days to between 20 and 30 days.33

Like other consumer electronic products, mobile handsets must go through a distributor before they get to the end user. However, unlike the distributors for consumer electronics, the distributors for mobile handsets provide more value-added than simply offering a highly connected distribution channel. The distributors for the mobile handsets are, in fact the mobile service operators. Companies like AT&T, Sprint, and Verizon Wireless purchase phones from handset manufacturers and sell them to customers with wireless services. In some instances, yet another retail layer exists between the service operators and the end users. For example, Sprint's wireless services and handsets can be purchased indirectly through Radio Shack.

Until recently, these wireless service providers have had complete and exclusive access to the end user. Additional services they offer, like voicemail, caller ID, call forwarding, and customer billing have been typically outsourced, but they are still delivered through their network. The service provider has had an exclusive relationship

with the end user. In the new age of wireless Internet, this will dynamic will change. As WAP applications begin to come online, service providers will be fighting with content and Internet application companies to get access to the wireless customer. The monopolistic days of owning the customer will be gone for the network service providers.

Over the coming years, global network operators will continue to continue to consolidate. They will require new strategies to protect revenue streams from fixed and wireless networks. In tomorrow's competition, there is every indication that operators who focus on volume and/or specialization will be the winners. Aggressive marketing, innovative new services, and packaged solutions in which even content are some of the methods being employed in the battle to win customers. Leading companies will be recognized for their ability to offer personalized services in which mobility will be one of the greatest benefits offered to customers.

New operators are attracting subscribers by offering free access to communication networks. These operators are seeking revenues higher up in the value chain by offering online services such as e-commerce and entertainment. This trend is a future threat to established operators who must offer the same terms to their customers. This is why operators are already beginning to offer Internet portals and forming alliances with content-oriented companies in the entertainment and information industries.

This dynamic will further change, as deregulation will allow other industries to provide wireless services. Companies like banks (e.g. Deutschebank) and online portals (e.g. Yahoo!) are considering offering wireless services once WAP becomes a
reality. In such a scenario, Yahoo! would purchase handsets from Ericsson, Nokia, or Siemens, and would provide wireless services to the end users. The benefits to Yahoo! would be that they would have control over the customer’s WAP Internet interface, and could, for example, direct him to Yahoo!’s page every time the device is activated. Banking services might offer free checking with the activation of a wireless service, essentially locking in the customer to that bank.

In addition to content, there is also the question of the operating system. In an effort to standardize the operating system for WAP devices, industry leaders have formed the Symbian consortium. The majority shareholder in that consortium is Psion, a British company that produces an open standard WAP operating system. Initially, it was thought that this open standardization would ease the way for the proliferation of WAP enabled devices. However, Ericsson’s partnership with Microsoft to gain access to its WindowsCE operating system, and Nokia’s partnership with Palm to gain access to its PalmOS operating system have created uncertainty in not only the eventual winner of the handset operating system, but the possibility for a universal standard. In the end, the fight for this type of access may turn out to be bigger than the “battle of the browsers” between Microsoft and Netscape, and completely alter the industry’s existing value chain.

2.5 Five Forces Analysis

We have begun to examine some the competitive issues taking place in the mobile handset

![Figure 11](image-url)
industry. Here we will take a more systematic approach to the competitive environment by applying a Five Forces analysis.

2.5.1 Supplier Power

There are two ways of looking at mobile handset suppliers in the coming years. The first is the component manufacturers. As mentioned before, these companies must work closely together to assure product delivery. Supplier power coming from the component manufacturers has traditionally been low for several reasons. The first is that each handset has on average over 10,000 individual components. The sheer number of suppliers, therefore, makes it difficult for any one supplier to exert any pressure on the handset manufacturers. Second, the number of handset manufacturers is low. Suppliers compete heavily for contracts with the larger phone manufacturers. Lastly, by using relations with multiple suppliers companies like Ericsson, Nokia, and Siemens have provided assurances against hold-up and problems during rapid ramp-ups due to rising demand. However, over the past year, both Ericsson and Nokia experienced their own product delays as suppliers fell behind schedule.

One of the most important components of the wireless handset is the wireless chip. These chips are custom designed and manufactured for each handset and for each network. There are five major players supplying wireless handset manufacturers with chips: Qualcomm, Nokia, Motorola, Phillips, and Intel. The

![Market Share of Leading Wireless Chip Manufacturers](image)

Source: Micrologic Research

Figure 12
demand for these chips is great and the industry has occasionally seen a drop in the availability of these chips. This has driven many handset makers to either design and manufacture their own chips (like Nokia), or develop close relationships with the suppliers in an effort to become favored customers. In the future, as the mobile Internet increases demand, supply will ultimately become less of a problem as either current suppliers ramp up production, or others enter looking for easy profits in a non-competitive market.

The second type of supplier is the company who delivers the device’s operating system (OS). Currently, phone manufacturers develop their own OS for mobile phones. However, as these devices become increasingly complex with the addition of wireless services, mini-browsers will be required to access the wireless Internet. Partnerships, like Symbian using Psion’s EPOC OS, have promised open source operating systems. However, even with such alliances, these companies still hold a lot of power. A proprietary OS such as WindowsCE will transfer a lot of power to the OS owner, and the phone makers are fighting hard to avoid a hold-up situation against Microsoft. To avoid such situations, phone manufacturers are covering their bets. Nokia has also teamed up with Palm, and Ericsson has partnered with Microsoft. Prior to these agreements, it looked as if a combination of the Palm and the Epoc OS might be the winner, but now it is anyone’s guess.

The unfortunate players in all of this are the handset manufacturers who seem to be moving in the wrong direction by giving up more and more power to their suppliers.
2.5.2 Buyer Power

Buyer power has traditionally been high. Few, large network providers wanting to buy large volumes and sell under their own brands dominated the market. In high penetration markets, subsidies are no longer necessary and subscribers can select among several phones. The phone makers try to counter this by building brand loyalty and offering additional services like address books that add value while increasing the switching cost since currently there are no standard operation system or data formats. The network operators are normally the only buyers in low penetration markets and have a strong bargaining position when negotiating large purchase contracts.

However, that trend will change. Deregulation and the promise of 3G will allow the entrants to enter the wireless services market. For example, virtual mobile operators will appear buying airtime wholesale from the 3G license holders and other larger operators. This will continue to spur demand for mobile devices, and will also reduce the power of traditional network operators. This is already happening. In the U.S. for example, the network operator market is incredibly fragmented (Figure 13). While Verizon Wireless, a company formed by a merger between GTE, AirTouch, and Bell Atlantic Mobile, owns approximately 28 percent of the market, numerous smaller players control as much as 35 percent of the market.\footnote{From a presentation given by Amit Jain and Petter Karal of MIT's MediaTech Club, May 9, 2000.}
Although such high industry segmentation reduces buyer power, these operators won't go without a fight. Mobile device manufacturers can expect operators to pressure them into exclusive contracts or at least preferred buying status to keep new operators out of the game. In the end, this will mean more mobile devices out in the market with more companies offering them.

2.5.3 Entry Barriers

Entry into the mobile phone maker industry used to be difficult for several reasons. The producers had to compete for contracts to supply the network operators with handsets according to their specifications, often competing with the carriers' own production units. Expensive production facilities limited the market to capital-rich companies that could produce large enough volumes to achieve economies of scale. However, deregulation broke down such old monopolies, and new network providers have emerged. Nonetheless, large production volumes are still favored in order to drive down prices and increase the overall size of the market.

Production of mobile phone requires intimate knowledge of a diverse set of technologies: antennas, voice and data transmission over radio waves, analog to digital conversion, chips, user interfaces, displays and batteries, as well as manufacturing skills that few companies have. New technology enabling wireless Internet services adds to the complexity, but opens up inroads for software companies and modem, pager and PC producers. Neopoint, a Korean manufacturer with PC production experience, has proved it is possible to enter the industry by producing an innovative phone based on laptop features like a touch screen and a touch pad for menu navigation.
This trend by new entrants is terrifying most handset manufacturers. While expertise is difficult to gain, it is not impossible—especially for those companies already in the consumer electronics business. As the market for mobile handsets continues on its exponential growth curve, it will become increasingly attractive to outside players to make the investments necessary to enter the market. One of the biggest competitive threats for Ericsson, Nokia, and Siemens is the entrants of Asian consumer electronics companies like Sony, Panasonic, and LG, leaders in the consumer electronics market. As phones become commoditized, so will the technology, making it easy for a company like Sony to enter the market. If (and when) this happens, it will drive the prices of phones down to the point where high volume and razor thin margins become the norm. This is exactly what has happened in the PC market, and is expected to happen here.

Additionally, as the convergence of devices continues, the wireless device market will see entrants from other industries such as the PDA industry. Companies like Palm have already released devices like the Palm VII that access the Internet through wireless connections. Just as it is not difficult to imagine an Ericsson device that can transmit data, it is not difficult to anticipate a Palm device that will be able to transmit voice.

Nokia, for one, has anticipated new entrants into the market, and have spent a significant portion of its revenue on building its brand name through direct consumer marketing. As just an example, the company spent millions of dollars to sponsor the Sugar Bowl (now officially named the Nokia Sugar Bowl) to have its name on every
player's helmet, every uniform shirt, the goal posts, the walls surrounding the field, and the 50-yard line. As a result, Nokia is the 11th most recognized brand in the world.\textsuperscript{35} While marketing will keep the company in the mind of the consumer, Nokia must ask itself if it wants to compete with like of Sony and other consumer electronics companies.

2.5.4 Rivalry

The rivalry is intense between the phone manufacturers as they compete for a $22 billion global market.\textsuperscript{36} They focus on keeping production lines active, and are consistently worried about missing the boat on new market trends.\textsuperscript{37} These companies have traditionally competed on tangible features like battery life, size and weight, color and voice quality and intangible factors like design and brand status. The result has been a race to develop new features to gain a first-mover advantage and customer lock-in. In a market with low penetration it was important to get deals with the network providers and develop the market together with them.

However, those times have changed. Last year, more than 400 million mobile phones were sold. That is expected to grow to over 1 billion in 2003.\textsuperscript{38} In this more mature market it is vital to have a broad product portfolio attracting the different market segments and to build brand loyalty to secure future replacement purchases as new technologies and services emerge.

In an effort to gain a more customer facing view, some mobile handset manufacturers have tested the waters of wireless services. Nokia, for example, made a lukewarm attempt to get into the wireless services game by striking a series of content

\textsuperscript{36} Based on market size calculations.
\textsuperscript{37} Based on an interview on March 24, 2000 with Pekka Ala-Pietilä, the President of Nokia.
partnerships with companies like CNN to deliver information to the users of their handsets. To take customers to their partners’ services, they programmed a link into the menu on the phone’s screen. Wireless operators, suspicious that the handset manufacturer was poised to enter a market they thought was theirs—supplying the advanced data services for which they could charge a premium—began applying pressure to Nokia threatening alienation. In the end, Nokia backpedaled, saying that is was only a proof-of-concept initiative to show users the potential of the WAP services. Ericsson has followed suit explicitly saying it is not planning on entering the content game.

2.5.5 Substitutes

For many years, there were few substitutes to mobile phones other than pagers. However, that too is changing. As we discussed earlier, substitutes will come in many forms and will begin to converge as other devices begin to access the Internet through WAP. Devices like pagers, PDAs, conventional phones, and PCs, will combine to create new derivations of one another as they strive to combine communication services like voice, email, Internet, Intranets, and data networks. The phone makers hope to grab market share from the substitutes by offering the integration of many of these functions and services in one device, but that is a two-way street. Device makers hope to grab market share from industry leaders like Nokia and Ericsson.

2.6 Conclusions

While the Internet has revolutionized how we interact with one another, the mobile paradigm shift will revolutionize where we interact with one another. Mobile

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device manufacturers are relying on this new market for exponential growth and profitability. However, they are in a very difficult position.

New trends like the convergence of devices is bringing new entrants into the market from industries perhaps not anticipated several years ago. Mobile phones will migrate to become mobile devices, and incumbents’ core competencies will have to migrate along with them. This increasing competition will ultimately result in the commoditization of their products. The real value will no longer rest in the device, but will lie in the services provided through the device. Like the PC, the mobile device will simply be the mechanism through which value is delivered to the customer.

In an effort to gain more access to the end users then, companies like Nokia and Ericsson will have to look for other value added services. Yet, the competitive structure of the industry may not allow them to do so. Fearful of having their suppliers become their competitors, network operators have resisted, and will continue to resist the handset manufacturers from getting access to the end user and creating a lock-in situation.

Handset manufacturers are giving up additional value by outsourcing the OS. In the end, they may be left with not direct customer connection, and may force incumbents to rely on the growing demand for handsets as their main source of growth.

One way these companies can get access to the value adding services is through partnerships and equity investments in services and application providers. This indirect route may be the only way for them to keep from being locked out of “owning the customer.” Companies like Nokia have addressed this issue by developing an internal business development department whose job it is to look for such strategic
partnerships. Ericsson, while they have made significant equity investments as well as acquisitions, has no department dedicated to this area. This may hurt their future growth. Siemens, playing a minor role in the handset market, but entering without legacy relationships with network operators, may be in a better position to develop these value-added services internally. In the end, all these companies must realize that their products will become commoditized and that they must somehow gain direct access to the customer.
CHAPTER 3: Nokia

- Company Overview (Description of different divisions.)
- Examining the Value Chain
- (What are they doing to take advantage of e-Business?)
- The Execution (How far have they gotten in implementing the strategy?)

3.1 Company Overview

During most of its existence, Nokia was a broadly diversified and unstructured conglomerate with a portfolio ranging from cables, paper, pulp, and rubber shoes to TVs and tires. The company came under existential pressure at the advent of the collapse of the Soviet Union. This macroeconomic intrusion in 1992 eroded away a large part of the Finnish economy. Above this domestic emergency halt and due to the lack of a business portfolio that generated international revenue sources, Nokia’s future was highly questionable. But it also paved the path for Jorma Ollila, then head of the mobile phone division, and with him a revolutionary business transformation.

As the former head of the mobile division of the firm, the new CEO predicted the explosive growth in wireless communications. With this in mind, all but the mobile communication was divested. This bold move was in itself a novum in state run Finland and that it was not blocked shows the desperation for survival of not only this country but all neighboring countries that relied with their GDP from the export to the former member state of the Russians.

Free of cash limitations after the proceeds of the divestitures, the firm invested heavily on research and development in the wireless telecommunication industry. This move basically prevented not only a bankruptcy from Nokia but also reinvented Finland
and set for it a new identity as the “Silicon Valley for wireless network equipment and mobile phones.”

Concerted efforts turned Nokia into the largest company in Finland, accounting for approximately 10% of its GDP, more than half the value of Finland's stock exchange and a ranking on the fifth position of Finland's export leader. Further rewarding, Nokia became at the end of 2000 the company in Europe with the highest market capitalization, and stock market's darling as the best performer in Europe's the last decade. An impressive share value increase of more than 500 times of its original value speaks for itself.

At the time of this thesis, Nokia is a global company with sales in 140 countries, 52 R&D centers in 14 countries and 53,000 employees. Symbolically with the beginning of the millennium, Nokia surpassed Motorola and Ericsson to became the leading wireless phone manufacturer. Prior to this breakthrough, the firm consistently outperformed its competitors and demonstrated above market growth rates in sales, ROE and RONA.
One of the growth drivers is clearly the focus on consumer branding. The continuous investment as a strategic differentiation rewarded Nokia with the 11th strongest brand in the world and the strongest non-US brand.

3.1.1 Organization

Mobile Phones and Networks; two main units make up 60% and 33% of sales respectively. Communication Products, the third group, produces and sells interactive multimedia terminals and advanced PC and workstation monitors.

As a backbone of their success are the global distributed Research and Development Centers that account for spending in excess of 9% of revenues on R&D and employ more than 17,000 people. Even if the world becomes global, Nokia masters the local content and demonstrates the competence of managing remotely and dispersed research, development and manufacturing facilities.

Completing the structure is the Ventures Organization. Positioning Nokia as a technology leader in the future of the mobile universe, this group complements through venturing and acquisition and crusades into applications that might be of relevance for the portfolio.
In the style of a true market leader, Nokia created with its vision of the "Mobile Information Society" a mindset that now dictates the thoughts of the followers. This strong notion of leadership returns in the firm's market lead concerning infrastructure and handsets for the Wireless Application Protocol (WAP). As one the building blocks for the convergence towards a mobile Internet, the company has already taken the control setting the minds.

3.1.2 Managerial Structure

Visionary leadership as we found with the definition of the mobile information society paradigm, keeps the organization stimulated and thus keeps it alive for changes in direction. Encouraging creating and sharing is the underlying theme that allows the innovation process to prosper with always-new ideas and results. Whereas the freedom for innovation and teamwork is key, under-performance in achieving sales and financial targets is less tolerated.

3.1.3 Human Resource Management

As an elementary module of the Finish value system, the respect for the individual is highly regarded within Nokia. Employees are understood as the building blocks of the firm and are encouraged with continuous learning programs to keep up the skills with actual developments.

The Reward system is based upon the understanding that the individual and the group shall participate in the efforts and rewards of their work. Nokia incentivizes their staff with individual incentive plans, program/project incentive plans and team/production incentive plans.
3.1.4 Technology Development

Mastering the challenge of managing the output of a global organization (52 R&D centers in 14 countries) Nokia took a very integrated approach for the R&D efforts. A thorough communication on an almost daily interaction that embraces the whole corporate process and local business units leads to a transparent and very customer oriented approach. We believe that Nokia’s output of more than 18 mobile phones per year is not only a benchmark for the competitors but also a sign of the strength of this well intertwined system.

3.1.5 Procurement and Inbound Logistics

Three building blocks form the backbone of the superior procurement and logistic backbone:

- Module design platform
- JIT inventory system
- Close relationship with suppliers

3.1.6 Marketing and Customer Service

What seems to be the most difficult undertaking in all-marketing efforts, Nokia achieve in a very short period. The brand awareness of the firm is leading the pack as the best non-US brand. Nokia’s handsets are for many customers a question of status symbol or fashion statement. This counts for their entire comprehensive product portfolio. This clear understanding of the motives of their customers turned them into such an appealing brand.

Another benchmark that demonstrates the customer focus of Nokia is the achieved level of customer satisfaction. The firm outruns the competition with 18% above the global high-tech norm.
3.2 Analysis of Threats:

In 1999, Nokia to the lead in both market share and units shipped in the handset business. It forecasted the current boom at the low cost end of the market and built around it a strong brand and an even broader product range. Pushing the envelope with time to market, Nokia has developed fashionable devices, giving them the ability to make money on cheap, entry-level phones while maintaining just under a 25 percent margin. At the same time, it embraced the shift in progress toward higher tech, higher margin products. With the advent of the 2.5th Generation and 3rd Generation of infrastructure products and solution, the shift towards higher data transfer speeds over mobile networks could boost sales of these high spec and higher margin phones.

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Nokia stormed from almost bankruptcy to the highly profitable leadership position of wireless handset in less than 10 years. We adore this success, but to the same extent raise several concerns:

Firstly, can Nokia continue this growth and can it sustain its leadership position? Specifically we see challenges arising since they left the position of an attacker to a leader.

Numerous other companies have experienced complacency, lack of attention, succession problems, and other causes entering the organization and successively leading to the loss of leadership. Clayton Christensen describes several of these scenarios in his renowned book “Innovators Dilemma”. In an interview with the President of Nokia Pekka Ala-Pietila, loosing the time-to-market momentum and missing future trends were major worries for this top-manager.

If Nokia is going to continue to be one of the successful turnaround stories of the century, it needs to demonstrate continuous leadership and the willingness to embrace change that even can lead to cannibalizing its core business. The business models within the value chain are rapidly changing and what is valid today may no longer be valid tomorrow. With this in mind, Nokia needs to stay fully alert for changes and must be prepared to enter new ventures in which the firm needs to learn new concepts of doing business.

Secondly, the handsets will eventually become commodities in much the same way PCs have become commodities. This will lead over time to significant reductions of gross margins. Today’s product portfolio reveals that Nokia relies heavily on the handset sales volume, with it accounting for more than 65% of its revenues and a major share of earnings. Increasingly with the emergence of the 2.5G and 3G networks,
devices will eventually be sold in a very competitive environment. Within this year, WAP phones are expected to drop from $500 to $200 in an effort to spur demand.40

Thirdly, based upon the market efficiency theorem, profitable returns attract new entrants and increase the competition for market share. This will certainly take place with the convergence towards the mobile Internet, and will cause prices (and margins) to shrink. Mobile phones will merge with other devices like pagers, PDAs, and others and will become products of the consumer electronic markets. Having said this, this will also lead to competition based upon the rules of the consumer goods industry. Consumer electronics companies like Sony, Panasonic, Samsung, and Hewlett Packard are masters of this universe, and firms like Nokia will have to learn to play on their terms. Essentially, it is going to be a new ballgame and in the end, high volume distribution with penny profits per unit is a specific threat to Nokia.

Furthermore, the fragmentation of the value chain as described in the previous chapter means that handsets will now longer be distributed solely through the network operators. This luxury ends now and Nokia needs to find additional distribution partners and alliances that secure the reach to the customer of the mobile device. The difficulty lies in the nature of these old and new distribution partners.

On the one hand, each of them follows their own agenda. This, by its very nature, will create a competitive atmosphere. For the sake of high volume distribution, Nokia must deal with all these vendors.

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40 Mark Williams, "Thinking Thin," Red Herring, April 28, 2000, p. 250.
Future value chain

Figure 18

The actual vulnerability lies in the fact that the traditional customer, the network operators, generates the most of the actual business. The buying power of these firms is very high. With the change of the value chain, Nokia could face hold up situations because it traditional customers like the wireless carriers AT&T and T-Online could threaten to change handset vendors if they began seeing that Nokia is also servicing the new entrants. A loss of only a couple of network operators as customers could significantly hurt the financial strength of the Finish firm substantially.

Furthermore, Nokia is challenged with this transformation of the value chain since it implies a total new approach to the market. Whereas the product features drove the old business model, the applications and solutions approach will drive the sales of devices in the coming era. In other words, the focus of the mobile communications industry is shifting from technology driven applications to application driven solutions. The applications will drive the infrastructure and terminal evolution.
We believe that Nokia's leadership position, the strong brand recognition, and the segmentation of its product lines along lifestyle statements will give them some lead time for the transformation. But in the end the user-centered solution approach adapted to the needs of each player in the distribution chain will be the key to success. Despite the fact that we see promising alliances with access providers (Sonera, Telefonica, Vodafone, etc.), service providers (Deutsche Bank, Merita Nordbanken, SwissAir, etc.) and others, this battle has just started and there is no dominant winner yet.

We foresee that the consumer electronic companies will move in fast and with a much higher understanding of the distribution of content and data. These players will challenge Nokia in territories that our candidate might have to learn first.

Last but not least, Nokia's product line directs clearly towards the fulfillment of their vision of the Wireless Information Society. To succeed, this would require the broad deployment of the 3G infrastructure. Here we see another major threat arising.

To support our point, we took the case of the UK auctions for the 3G mobile phone spectrum licenses that closed at the astonishing price of 22.48 billion pounds as we wrote the final pages of this thesis.

After one hundred fifty rounds and nearly eight weeks, the five winners Vodafone (NYSE: VOD), British Telecommunications (NYSE: BTY), One2One, Orange, and Telesystem International Wireless UTMS (Nasdaq: TIWI) spend this combined amount to gain the ownership for the next generation licenses.

We share broad skepticism about the return of investment justifications. But even more breathtaking is the fact that this is the license portion of the 3G infrastructure only. In addition, estimations of the cost of building the network run in the range of £2.5 billion to £6 billion—and this is only for the British network.
For Nokia, our biggest concern here is that the deployment of 3G will take longer than expected because the winners will time the deployment according to their feasible timeline. Thus Nokia is dependent on the network operators, and any slowdown on their side will impact the performance of the handset producers.

Furthermore, the question returns how popular 3G services—such as email, banking, e-commerce, and Internet access over mobile phones—will prove with consumers. More urgently, the financial implications from the auctions also raise the question of how much consumers will have to pay for it.

Estimations signal that consumers in the UK might have to spend at least £60 to £100 a month, if operators are to turn a profit. The operators need to offer added services, like mobile portals, e-commerce sites and directories, and unified messaging and payment solutions that would justify the higher subscription price, and in return would also keep the timing on line with the original deployment.

The domino effect of this trend is especially dangerous, as it could mean soaring consumer costs across Europe. Should the increase of fees exceed the willingness of consumers to spend on these gadgets and services, the market will face a dramatic slowdown.

We are convinced that carriers will opt more for extension of existing network infrastructure. We will see several efforts to upgrade 2G into 2.5G infrastructure. GSM and TDMA will be enhanced with GPRS features, CDMA will merge into CDMA 2000. This is by far less capital expensive and leads also to the performance required for the initial mobile Internet applications. In addition, it does not lead to compatibility breaks between 3G networks and older infrastructure. But it also means that global roaming will still require bridges between 2.5G and 3G infrastructure.
As an important side note, this effect intertwined as an integral part of the convergence could ultimately mean that it could hinder further Internet adoption in Europe, especially considering that for Europeans, mobile phones will be one of the first platforms from which they will be able to access the Internet. In the UK, Internet penetration currently stands at 22 percent, while mobile phone penetration stands at 56 percent. In Italy, the numbers are even more dramatic: PC penetration stands at 3 percent while mobile penetration has reached 58 percent.41

At the end of the food chain, Nokia could suffer enormously since it has no means of changing the behavior of the network operator. It will be forced to continue to develop and maintain devices that support a multitude of standards and networks. These efforts will be to some extent a competitive disadvantage for a broad product range since the development will always require the support of several standards. Thus the economies of scale will not happen unless Nokia manages to gain more volume sales.

To a large extent Nokia has countered this development with a modular design with a component-based architecture of all the essential buildings blocks of its handset. The move towards an even higher degree of software modules Nokia has prepared itself by hiring more than 5000 software engineers in the last couple of years. Nevertheless, the sales and distribution process for the company will become more difficult in the fragmented value chain. This is the challenge for Nokia.

Another paradigm shift happens as we observe this industry and we are convinced that Nokia’s efforts in customer segmentation and brand awareness will help them to stay a leading player. The mobile devices are still developed by technologists

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for technologists. For a broad and pervasive acceptance need to originate from human centered designs. As features and services multiply and become more complex, they have to become faster and easier to use. This is why all of the product development efforts should be based on a principle called Human Technology. We believe that Nokia has proven that they understand the consumer needs and we think that they are taking the lead in designing devices and create solutions that match this principle.

Consequently, all these threats will lead in one way or another to an increase in customer acquisition costs, and paired with the decreases of sales margins will result in additional efforts for the firm to sustain its profitability.

The company needs to undertake concerted efforts to sustain its operational excellency. Nokia already is a master in managing the logistics of smart manufacturing and component sourcing. It needs to continuously improve this capability and enhance its scope through alliances.

Teaming up with major players from the consumer electronics is in our opinion a viable option. Specifically, this could work well for the low cost devices segment. We are confident that Nokia is already considering new ways to stay ahead of the others. For example, Nokia has signed an alliance with Cisco for their infrastructure business. In recognition of the convergence in this networking environment, Nokia is teaming up with the indisputable leader and safeguards the cooperation rather than the competition for the backbone of its infrastructure business.

Venturing is another way of getting access to markets or achieving new competitive benefits. Based on the findings below, we found that Nokia is enhancing its engagement to create a solution/application-based portfolio that could eventually lead to an increased demand for wireless devices.
<table>
<thead>
<tr>
<th>Invested Firm</th>
<th>Time</th>
<th>Expertise</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geoworks</td>
<td>Feb 1995</td>
<td>Provides a cost-competitive software solution which makes efficient use of memory, an existing processor platform and a proven operating system.</td>
<td>The Geoworks vision of affordable, high-performance consumer computing devices coincides with the Nokia vision of various wireless multimedia terminals for different consumer segments. Moreover, Nokia values the entrepreneurial spirit of Geoworks and its willingness to listen to the customer’s needs.</td>
</tr>
<tr>
<td>Diamond Lane Communications Corp</td>
<td>Feb 1998</td>
<td>One of the first companies in the world to commercially offer DSL data access.</td>
<td>With this investment, Nokia is strengthening its capability to serve the emerging Internet-driven mass market, which will grow dramatically during the next few years.</td>
</tr>
<tr>
<td>Evoice</td>
<td>Jun 1999</td>
<td>EVoice is an IP telephony company dedicated to providing convenient messaging solutions via the Internet.</td>
<td>VoIP technology.</td>
</tr>
<tr>
<td>NetSanity, Inc</td>
<td>Dec 1999</td>
<td>NetSanity leads a new category of information management and distribution technologies, powering end users to better manage their network of personal information.</td>
<td>Through NetSanity, Internet sites will acquire new customers, increase site traffic and establish a direct relationship with their customers. Nokia sees great promise for this company.</td>
</tr>
<tr>
<td>CALY Networks</td>
<td>?</td>
<td>Ng2058 CALY Networks is involved in the development of next generation transmission and switching systems for the local loop.</td>
<td>Supplement internal R&amp;D</td>
</tr>
<tr>
<td>Mainsail Networks</td>
<td>?</td>
<td>Developer of universal platform for variable-band, local-loop exchange for voice, video, and data.</td>
<td>Supplement internal R&amp;D</td>
</tr>
<tr>
<td>610MongoMusic, Inc.</td>
<td>Jan 2000</td>
<td>An online music site that plans to dramatically change the music industry with patent-pending technology that will enable listeners to identify and expand upon the types of music they enjoy.</td>
<td>Internet related technology.</td>
</tr>
</tbody>
</table>

Table 4
CHAPTER 4: Ericsson LM

- Company Overview (Description of different divisions.)
- Examining the Value Chain
- (What are they doing to take advantage of e-Business?)
- The Execution (How far have they gotten in implementing the strategy?)

4.1 Company Overview

Ericsson is a total solutions supplier for all customer segments: network operators and service providers, enterprises and consumers and is offering advanced communications solutions for mobile and fixed networks, as well as consumer products.

With more than 100,000 employees, representation in 140 countries and one of the world’s largest customer base in the telecommunications field it is well poised to sustain its competitive role. The company targets the market of wireless technologies, highly robust networks and technology based on the Internet Protocol. Some of the key success factors are the worldwide presence, its research and development centers, a broad product portfolio with strong solutions in many customer segments and its leadership in wireless technology and mobility. With at least 20 percent growth per annum the firm targets exceed the CAGR of the market.

Ericsson’s operations are divided into three business segments:

- Network Operators and Service Providers,
- Enterprise Solutions
- Consumer Products

Today, Ericsson is present in 140 countries and more than 95 percent of sales originate from outside of Sweden, making Ericsson the most international of all companies in the industry. Sales in Europe, Africa and the Middle East represented 53
percent of Ericsson’s total sales in 1998. The markets in Asia Pacific represented 23 percent, Latin America 14 percent and the North American market 10 percent.42

4.1.1 Ten Largest Markets (percentage of total sales, 1998)43

In 1998, Ericsson invested USD 3.7 billion in R&D, corresponding to 16 percent of sales. More than 23,000 employees in 23 countries are active in research and development.

Ericsson’s key to success in the highly competitive market is a strategy built on customer focus with a customer-oriented and flexible organization, managed by a strong corporate structure responsible for strategic decisions.

4.1.2 Network Operators and Service Providers

Ericsson offers total end-to-end solutions for both mobile and fixed networks, including a range of services. Ericsson also offers solutions for the emerging markets created by the important trends of convergence of telecom and datacom, and of fixed and mobile services. Ericsson combines its unique position in wireless and its competence in building robust and reliable networks with a strong commitment to IP technology.

42 Ericsson 1999 Annual Report.
The company owns with its broad mobile communications technology a strong foundation for future growth. With approximately 350 mobile network operators that are Ericsson customers it take the lead in the infrastructure business.

The technology portfolio is very impressive and shows the global reach of this organization. Ericsson delivers systems for all major mobile standards. GSM, the largest standard in the world, continues to show strong growth and the number of subscribers connected to GSM is currently more than 150 million. The PDC standard, deployed in Japan only, has close to 45 million subscribers and TDMA close to 25 million. GSM has strengthened its position as the most widely used standard. Of all cellular users worldwide, some 45 percent communicate over GSM networks. TDMA and AMPS users combined represent some 30 percent. The acquisition of Qualcomm's infrastructure business in March 1999 adds CDMAOne to the Ericsson portfolio. This means that Ericsson can supply infrastructure, and also mobile phones starting 2000, to all digital mobile standards in the world.

4.2 Mobile Datacom Convergence

The company is clearly one of the leaders in the development of third-generation mobile networks. In 1998, the acquisition of Qualcomm's infrastructure business further enhanced Ericsson's position for the third generation mobile systems with cdma2000 offerings. We think that Ericsson possesses a complete portfolio for digital systems and is well prepared for upcoming third generation mobile systems.

Ericsson is also currently sharing its 3G knowledge with operators and others via experimental systems in Japan (already commercial) Germany, Italy, UK, USA, Canada, Sweden, Japan and China.
Its position in the 2.5 Generation networks looks very focused too. Based upon packet-switched technologies such as GPRS and EDGE, GSM and TDMA can be evolved to handle high traffic data communications. This means that GPRS is the first step toward third generation. To date, Ericsson seems t have the lead in the GPRS market and based upon on data sources\textsuperscript{44} has captured 60 percent of all GPRS contracts in the world.

4.3 IP and datacom

The strategic approach here is the In-house development, partnering and by pursuing an acquisition strategy. The firm focuses on small to medium-sized companies with complementary technology. As part of the following chapter we analyzed which companies Ericsson target as venturing activities:

<table>
<thead>
<tr>
<th>Invested Firm</th>
<th>Time</th>
<th>Expertise</th>
<th>Reason</th>
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<tbody>
<tr>
<td>Mariposa Technology Inc., a start-up innovator in intelligent voice/data access solutions over ATM</td>
<td>Jun 1998</td>
<td>Mariposa's award-winning technology, the ATM Turbo eXchange, is the industry's first ATM wide-area network access solution for efficiently switching toll-quality voice, fax, LAN and legacy data over ATM networks using bandwidth-on-demand switched virtual circuits and T1 links.</td>
<td>The investment strengthens and expands the current relationship between the two companies and serves as a basis for future development. Partnering with Mariposa enables Ericsson to significantly expand its offering of end-to-end solutions for voice and data services to Internet Service Providers, Enterprise Customers and Telecom Carriers.</td>
</tr>
<tr>
<td>C Technologies AB</td>
<td>Oct 1998</td>
<td>C Tech is focused on advanced real time image processing for handheld devices. Its product, C Pen, is the first image processing based electronic pen in the world.</td>
<td>The investment will put Ericsson in the lead in the area of handheld information collection devices. The C Pen and future enhanced versions of it makes a strategic complement to Ericsson's product offering in mobile phones, wireless data products and technologies such as Bluetooth.</td>
</tr>
<tr>
<td>Juniper Networks</td>
<td>Mar 1999</td>
<td>Juniper manufactures high-speed routers. Together with Cisco, it dominates the relatively new market in gigabit routers.</td>
<td>Through partial ownership of Juniper, Ericsson is able to offer solutions, in this area as well. In addition, a distribution agreement allows Ericsson to sell Juniper's data switch, the M40 Internet backbone router, as an integrated component of Ericsson systems.</td>
</tr>
<tr>
<td>OZ.COM</td>
<td>Jun 1999</td>
<td>OZ.COM is a pioneer in scalable, interactive real-time communications products that integrates the Internet, traditional</td>
<td>The investment in OZ strengthens Ericsson's role in creation of software applications for innovative Internet voice and datacom services. The investment further underscores</td>
</tr>
</tbody>
</table>
4.4 Analysis of Threats

Not surprising, the same industry trends that are threatening Nokia's business are also affecting Ericsson. However, because Ericsson's business strategy and core competencies are so different, it is not surprising that these trends are going to affect it in very different ways.

The convergence of handheld devices is also important to Ericsson. It will create opportunities for traditional consumer electronic companies to enter. This will ultimately begin to eat away at the handheld market share of traditional mobile phone manufacturers like Ericsson and Nokia.

Both Ericsson and Nokia have relied on exponential growth in handset sales for expanding their business. As Figure 20 shows, the number of phone subscribers worldwide is expected to reach nearly 600 million by 2002—up from 194 million in 1997.\(^{45}\) And, with a 1.5 year life cycle for the average mobile phone, that will add up to large revenues for handset manufacturers. However, Ericsson relies on only 20 percent of revenues to come from the sale of mobile handsets, as opposed to Nokia's 60 percent. Yet, Ericsson has been increasing its focus on the consumer products side of its business and has been trying to increase its market share of

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handhelds. So, while 20 percent in not an insignificant portion of revenues, this threat will play a bigger role in shaping Ericsson’s longer-term strategy.

The delay of 3G is also presenting a threat to Ericsson. As Ericsson’s annual report states, it is anticipating a relatively quick rollout of 3G infrastructure with installations beginning in late 2002 and early 2003. However, some industry experts are expecting that it may not be until 2007 when 3G networks are fully deployed. 46 Currently Ericsson relies on infrastructure sales for approximately 69 percent of its sales. A delay of this magnitude will have dramatic effects on Ericsson’s revenues.

Lastly Ericsson must do something to maintain a customer facing presence. All sales of its handsets go through network operators. While in the future this will also include application providers, Ericsson, under its current business model will have to fight to take a piece of some of the value added services. As in the PC industry, the real value has been in the operating system and the applications that run on the computer, while the hardware has essentially been commoditized. Ericsson has begun to address this issue through strategic partnerships and acquisitions with companies like OZ.com.

Ericsson has also taken steps to take partial control of the operating system by engaging in a joint venture with Microsoft in December of 1999. Ericsson will own the majority share of the new company that promises to develop products that provide fast access to the Internet from any device. As part of the strategic partnership, Ericsson will provide Microsoft with its Wireless Application Protocol format while adopting Microsoft Mobile Explorer for Internet phones. While this deal ensures Ericsson is

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covering its bets, it creates uncertainty in the Symbian partnership, which is developing products based on Psion’s EPOC operating system.

Ericsson’s equity investments are largely business unit oriented. All activities are complementary to the existing scope of business. This strategy should give Ericsson a good stake in entrepreneurial companies and could become a strategic inroad into evolving technologies. Furthermore is a fast way to overcome own internal development deficiencies.
CHAPTER 5: Siemens—Information and Communication Mobile

We are focusing this chapter exclusively on the wireless business of Siemens. In contrary of the chapters 2 and 3 we are spending only a little time on an introduction to the company's organization and its products. The focus of this chapter will be the description of the attacker strategy of Siemens Information and Communication Mobile (ICM).

As of April 1,2000 Siemens combined two major divisions, namely its Communication on Air Division (CA) and its Communication Devices Division (CD) to form the business unit Information and Communication Mobile (ICM). The goal of ICM is to solely address the wireless telecommunication market. Siemens' intent is to outpace the growth of the mobile market and compete head-to-head with the two dominant players, Nokia and Ericsson. We will develop ideas that will show what approaches Siemens should take to become one of the dominant and profitable players.

5.1 Description of the Business Lines:

5.1.1 CA: Communication on Air

The Communication on Air (CA) business is built around mobile network and switching technology, mobile radio communication (including base stations) and antennas, and intelligent networks. The later are the prerequisite elements for localization, prepaid calls, and Friends and Family tariffs. All of the above units offer professional and financial services for the deployment and implementation of these projects. As it is a traditional project business, the time from acquisition to the final hand over of the project can take several months. For this reason, the CA business is
very different from a devices business where the essential factor is the number of units sold. Due to the nature of the customer, this business is internationally oriented. With 8,000 people, it achieved revenues of €2.4 Billion in 1999, and a solid but non-disclosed EBIT. As of today, 90% of the revenue is generated outside of Germany, 25% of it coming from China.

Siemens claims that one out of every three calls made on a GSM mobile phone is handled by Siemens mobile technology. It has built more than 120 GSM networks in 65 countries, putting it as number three in infrastructure networks, with a 12 percent market share. The targeted market share for the fiscal year is 20 percent in 2000. Siemens highlights the fact that it has achieved global leadership in intelligent networks (prepaid cards, location services, friends and family tariffs, et al), which according to the Forrester research, will be one of the killer applications for the next generation wireless technology (2.5 and 3G).

5.1.2 CD: Communication Devices

The Communications Devices (CD) business line extends the infrastructure business into the world of devices. It consists of wired phones, cordless phones, payphones, and mobile phones. It will also be the founding ground for new and innovative devices that will attribute to the convergence of wireless and PDA’s as discussed in Chapter 2. With 11,000 people using Siemens phones, 70 percent of the €2.7 billion in revenue was achieved abroad. Even more impressive is the fact, that although the market globally grew 65%, Siemens topped these numbers and grew 136% in Europe and 158% worldwide. It managed to position itself as number 3 in

47 Siemens I&C Mobile presented at the CeBit trade show the “Unifier,” its first gadget that combines both worlds
Europe and now ranks sixth globally in phone devices. In the DECT in-house wireless phone market, it even surpassed Philips, Samsung, Bosch, and Ericsson.

5.2 Financials

We found it important to note that this business unit of Siemens has achieved a dramatic turnaround in the last 2 years. Due to major difficulties including a significant loss, Siemens had considered the option to exit this business. However, it decided to continue with its commitment, and was rewarded with a turnaround of outstanding operating results. "Half-year earnings growth was driven primarily by improvements in operations at Siemens. Information and Communication Mobile (ICM) led the field with an EBIT (earnings before interest and taxes) of EUR527 million."

5.3 Don't Follow—Elements of the Attacker Strategy

We believe that a follower strategy for Siemens is not promising for the sustainability of the business of Information and Communication Mobile. The dominance of Ericsson in the infrastructure business and Nokia's lead in the handset business along with its strong brand name makes it difficult to conceive that Siemens ICM should opt for a follower strategy. However, the emergence of 3G networks and the convergence of voice and data will change the current industry status quo and present opportunities for new business models previously not possible. What Siemens should do and how it should attack incumbents like Nokia and Ericsson will be the focus of the following pages.

5.3.1 Geographical Strategy—Increase Market Position in Asia

Ahead of the game, Japan and China will deploy 2.5 and 3G infrastructure earlier than other countries. According to Strategis Group, a market research firm, by 2006

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48 Speech by Dr. v. Pierer, CEO Siemens AG, Analyst briefing on half year results.
China and Japan will have a staggering 46 million subscribers, or 1.5 times more 3G users than Europe. With its turnkey solutions from CA and CD, Siemens should expand these activities and establish an even stronger foothold in these fast growing markets. Ericsson has reported in its annual report form 1999 that its business has decreased in China. To the contrary Siemens has increased its share. We think that Siemens has a good window of opportunity that could allow it to jump into the lead of implementing 3G infrastructure ahead of Ericsson. However, it has to move very fast. Thus, it should build on existing contracts and work them into reference installations. Opinion leaders and political lobbying are key elements to doing business in China. Siemens is very familiar with these practices since it has been doing business in China for over 100 years.

Based on its good reputation and its power of lobbying, Siemens needs to convince other carriers and major corporations to use its turnkey solutions. For carriers, we believe that an all in one approach is the key to the success. This includes offering not only network infrastructure and handheld devices, but the software applications that are going to be critical to delivering the value of the wireless Web. Siemens has all the components and resources in-house to provide a turnkey solution. It needs to deliver all modules that cover the initial phase from a blueprint of the solution, to the hardware, the software, and application development.

5.3.2 Learn from I-mode and Repeat This Success in Europe as a WISI (Wireless Interactive System Integrator)

We have seen a repeating pattern: Generation of more data and voice traffic drives infrastructure expansion—more infrastructure drives more complex applications

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49 Red Herring, April 2000, p. 258.
which drives the need for handsets with increased functionality. NTT DoCoMo understood that the core value of wireless lies in its ability to provide personalized features. The development of I-mode as a new advanced wireless service already gives more than 6 million users a unique mobile experience. The applications are rather simple and nothing technologically fancy, yet for the network operator, it is a cash cow generating huge revenues for DoCoMo at marginal cost. The following excerpt from a Forrester report, dated February 15, 2000 shows the income streams for DoCoMo.

1. New data fees.
2. Billing and collection commissions.
3. Commission for Pay-per-use content
4. Additional voice minutes.
5. Lower churn rates
6. Championing open access

On top of all of this, these users will soon be ripe to be merged into 2.5G and in the future into 3G applications. If people, as in the case of I-mode users, are experienced in the usage of these devices, then they will quickly move up the learning curve on additional features making them relatively easy to sell. These applications will drive further consumer demand, which will put increasing demand on the network. More sophisticated applications will require more sophisticated networks creating a self-reinforcing circle of recurring income streams.

5.3.3 Becoming a Key Player in Wireless Services

We believe Siemens should initiate joint efforts in Germany with Deutsche Telecom and then quickly expand into other European countries when promoting its future mobile devices. Deregulation is forcing Deutsche Telecom to defend its business
and to increase the load on its capital-intensive telecommunication networks. From the pre-regulation area, Deutsche Telecom still has data on and access to millions of users. In addition, T-Online, a majority owned company of Deutsche Telecom is the biggest Internet Service provider in Germany and bordering Europe.

Pre-regulation, Siemens was the preferred vendor of choice for all telecommunication equipment. Although this has changed in the last couple of years as the environment became very competitive for Siemens, both businesses still have very strong ties to the important decision making levels. And, while no one would admit to it, Siemens still enjoys the advantage of being a domestic player receiving preferred treatment with many European companies in contract negotiations. Nokia and Ericsson do not have this advantage on German territory. Furthermore we do not believe that Nokia has yet built up sufficient skills to compete in the application arena. Thus it is in a vulnerable position. With its experience from its infrastructure business Ericsson seems to be better positioned, but does not enjoy the inroads as Siemens does.

ICM has to jointly develop 1-mode like applications and solutions with Deutsche Telecom. It can do this because its can access a large network of in-house and external application developers. Nevertheless, one of the building blocks for an 1-mode like businesses is the integration into the existing billing systems, the administration of the commission flows and the reliability of the always-on system. With its enterprise experience and its deep knowledge of its own infrastructure and devices that are installed broadly at Deutsche Telecom, Siemens has this know-how and is well placed to become this link.

In the long run and after a successful implementation, Siemens could position itself as the system integrator of choice for 1-mode like projects in Europe. This would
also differentiate the company against Nokia and Ericsson. The new threat to Siemens could be the traditional system integrators like EDS and IBM Global solutions. We believe that Siemens has a leading value proposition because it understands both converging worlds and this would be a unique differentiation. However, this is not easily done.

The potential problem with this course of action is that Siemens Information and Communication Mobile needs to sell its own equipment, and thus may not be device independent. We initially thought that this would be not a viable approach, but on closer review, realized the market may not accept it. Additionally, in an effort to reduce the supplier power, all carriers already use devices from multiple vendors to access their wireless services.

With the foundation of ICM, Siemens needs to make the application business an essential part of the new organization. It should create one unit “Mobile Solutions” that is tasked with the system integration of heterogeneous devices and infrastructure. It should move it all relevant professional skills into that line of business. In the short term, CD, being in charge of the devices directly competing with those by Noika and Ericsson, will have to stimulate innovation and improvements of features and functions through in-house feedback on shortcomings. Nevertheless, the applications will drive the sale of the devices. We believe that Siemens needs to focus even more on this field and the next pages will show potential ways of how to achieve this.

5.4 Apply Wireless to Dumb Devices and Other Appliances—Innovating the Mobile Industry

This is a broad field in which none of the main competitors can leverage its position as Siemens could. This results from the reach of the parent company and its product portfolio. The Divisions of Siemens comprise of:
Power Generation (KWU)
Power Transmission and Distribution (EV)
Automation and Drives (A&D)
Industrial Projects and Technical Services (ATD)
Production and Logistics Systems (PL)
Siemens Building Technologies (SBT)
Information and Communication Networks (ICN)
Information and Communication Networks (ICP)
Siemens Business Services (SBS)
Transportation Systems (VT)
Automotive Systems (AT)
Medical Engineering (Med)
Osram
Infineon (HL) Semiconductor
Epcos DRAM

All the divisions have tight access to key decision makers of major corporations in their segment. How can Siemens ICM capitalize from this position? It needs use these relationships to gain access and must develop application for very specific customer needs.

First of all, it needs to understand the scope of applications. It should focus on the opinion leaders in the relating industry. With them, Siemens needs to define and create of new set of applications. This should be done in teams consisting of staff members of the customers and cross-functional teams of ICM.

Imagine that the wireless handset informs the production manager of the status of its production and send alerts to the display that requires a course of actions of his side. ICM can deliver this through the contacts Industrial Projects and Technical Services (ATD). Neither Nokia nor Ericsson has these inroads.

Furthermore, think about a blood pressure device that monitors the person and that transmits data to the physician or hospital in an "always-on" mode. Deviations are sent immediately and the physician is either called or a near by ambulance is sent to pick him up. The ambulances would, of course, have mobile devices in the vehicles providing them real-time maps, directions, and warnings to congested areas of high
traffic. This application has the potential to create save many lives through increased responsiveness. Siemens ICM would have to access through its Medical Engineering division (Med) all major health care corporations or HMO's (Health Care Maintenance Organizations). Initiation of common projects would deliver applications that strengthen their competitive positions.

Furthermore, pharmaceutical companies could get live feedback on clinical trials with wireless technologies and solutions that Siemens delivers through their relations with their account management. Not only would it deliver real time data, but it would also broaden the test territory to a global base. How does a similar medicine work in different populations, and what areas for improvements need to be addressed? Live data feedback using wireless approaches can now be transmitted. Again ICM has the inroads to these accounts and whereas Nokia and Ericsson do not.

Last but not least, Siemens is capable to be one of the leaders in setting the path for the seamless communication between numerous devices. We described a scenario of how the world could change with the implementation of the Internet. Connecting household appliances (intelligent refrigerators that send alerts to the mobile devices if we are out of stock of our preferred goods), with personal devices, integrating them into supply chains of the grocery store and many more imaginable applications could be the technological playground for Siemens. Siemens not only possesses the knowledge and technology of Bluetooth devices, but with the joint venture of Siemens Bosch in the home appliances market, it own access to its own home appliances. Siemens' key complementary and appropriable asset is its diversity industry specialties, and its relationships with major corporations in almost every business sector.
5.4.1 **Align Content Providers with Preferred Application Links to Devices**

A good and replicable case is the partnership of ICM with Yahoo!. All new mobile terminals from Siemens will feature preprogrammed direct access to Yahoo! WAP content and will show text with optimized readability on the display. In addition Yahoo! will provide access to MyYahoo!, personalized WAP pages and services accessible free of charge. On the path to become a key player in the third generation of the UMTS market, Siemens should strike more partnerships of this kind with customers and partners to jointly develop individual portal pages for mobile communication devices or billing systems employing mobile communication.

5.4.2 **Gain Leadership in Corporate GSM Applications**

Siemens needs to leverage its stronghold in large corporation to offer solutions that allow companies to access existing infrastructure – i.e. communication servers and IP based data networks with wireless GSM devices. All important voice and data services can be made available in a very timely fashion. Cost reductions due to less expensive devices than the upgrade of the existing infrastructure go along with this innovation. Expanding on this, Siemens could easily enhance this into add-on applications. On-the-fly updates on price changes, technical changes delivered to the mobile devices of the sales force would represent a big efficiency improvement for many corporations. Siemens needs to use the existing relationships with these accounts and develop for them these reference applications. It would be able to build long-lasting ties and barriers to entry for competitors like Nokia and Ericsson.
5.4.3 Establish Complementary Partnerships to Enhance Portfolio of Products, Applications and Solutions

Existing partnerships with NEC, Neopoint, Yahoo!, Casio/Microsoft, Phone.com, and Opusware need to be turned into cross selling opportunities, advanced research and development alliances, or early access to technology innovation. We expect Siemens to not only add further partnerships to this list, but also to announce these partnerships more aggressively. To be very sufficient Siemens needs to be very stringent with its portfolio management. Its has to evaluate its strengths and weaknesses, identify white spaces and fill them, if not capable of doing it itself with alliances or through acquisitions or venturing.

5.4.4 Generic Growth and Acquisitions

Despite being impressed with the numbers achieved, does Siemens Mobile have the staying power to gain sufficient market share? Should it focus on joining forces with Ericsson to become the dominant player in the infrastructure, concentrate on the high-end market of the devices, or invest in the next generation of devices and source devices for the low end market from Asia from companies like JV, Samsung, or Panasonic? In any event these thoughts require capital resources that probably exceed the possibilities of the parent organization. Based upon our own judgment, this additional capital could be raised from the proceeds of an IPO of this business unit. We conclude that Siemens should screen the market for similar savings potential.

5.5 Analysis of Threats

5.5.1 Threat 1: Friction and Power Struggle after Merger

The businesses that were merged are very different in their approaches to the market. Hence, we see different attitudes and cultures between the project business
(Communication on Air) and the consumer business (Communication Devices). Friction and power struggles could slow down the organization in their execution. ICM needs to launch immediately repeating town meetings, bulletin boards, and other communication channels to all employees. It has to convey that this unit is one unit and that the employees need work together on achieving the targets. We recommend that due to the difference of these business models, the business units stay separate in their approach to the market. Nevertheless, we envision that ICM should set up incentive seems that promote the referral of leads or even sales through the different channels. Accordingly, common infrastructure resources, like Human Resources, and Accounting could be merged and generate efficiency within these processes and cost savings.

5.5.2 Threat 2: Move Fast to an e-Business Model

We believe that the manufacturing output cannot be expanded due to shortage of components on the world market. Forward looking, Siemens needs booster the customer satisfaction among the customers, distributors and carriers. Customer relationship management and other marketing tools like ABC analysis, cross selling, one-to-one marketing will become a key differentiation for Siemens. The basis for this will be the fast implementation of a customer-focused e-business strategy. Communication Devices already uses the same application and in the first 9 months of 1999 sold already more than 300 million D-Marks worth of mobile phones and other devices.

But also along the value chain toward procurement and logistics ICM needs to achieve a state-of-the-art e-business practice. It would achieve several benefits for itself but also for its suppliers. Firstly, it would know on each supplier level the
procurement level. This could be beneficial for contract negotiations. Furthermore it should install a very open system, in which it would tie in the suppliers and form a virtual supply chain system. All suppliers could access the status of the production timelines and deliver on Just-in-time norms their components for the handset or infrastructure products.

As we described in chapter 1, one of the key applications are for the procurement segments and specifically auctioning. As we have seen in Nokia's last annual report, one of the disturbing factors for their performance was the shortage of key elements for the handset devices. This incredible shortage of components, i.e. filters, DRAM's, antenna brings us to the conclusion that a strong business alliance to the suppliers is more important for Siemens than squeezing them for the last pennies in an auction like approach. Hence, Siemens has to link its key supplier into more decisions and changes of directions, but also build up stronger and even very personal relationships. It would build the ties to its suppliers on the base of trust and still deal on terms that guarantee the deliverables.

5.3.5 Threat 3: Branding Is Not Strength of Siemens

Siemens is a technology driven company, and in as we have revealed one of the success factors from Nokia is to be a master in developing strong brand recognition. We advise Siemens to partner with leading companies, i.e. IDEO that would fill this gap and help to build the brand around the strategy Siemens chooses to take.
CHAPTER 6: Conclusions

We have discussed many topics over the course of this paper. We have discussed how and why the Internet is strategically important, discussed the new role of the mobile Internet in creating new competitive opportunities, and examined several companies looking to leverage their roles as component suppliers of the mobile Internet future. We will conclude by first summarizing the changing competitive environment in the wireless industry created by the wireless Web, and at the same time, look into some potential future applications. The wireless Web is not only creating opportunities, but is also creating threats for many of today's market leaders. The current balance of power within the wireless telecommunications industry is being disrupted by the demand for wireless data communication, and there is no guarantee that the incumbents of today will be ones who will capture the lion's share of the value created. Lastly, we will look at the threats specific to each of companies we examined (Ericsson, Nokia, and Siemens), and suggest courses of action.

6.1 Areas of Change for Mobile Handset Manufacturers

It is just a matter of time before the wireless Web becomes as ubiquitous as the wired Internet is today. By 2003, it is estimated that there will be over 1 billion mobile phones in the market, with data making up 50% of wireless traffic.\(^5\) Already, there are approximately 350 million wireless subscribers while only 150 million Internet subscribers. Of the Internet subscribers in the U.S., 78% of them also subscribe to wireless services. To further emphasize the demand being generated for efficient mobile services, there are approximately 60 million mobile workers in U.S., owning
approximately 49 million laptops, and 12 million PDA's. Of those laptop users, 75% have wireless phones. The trends towards the convergence of voice and data, and the convergence of devices are clear. However, at the same time, these convergences are having dramatic effects on the industry.

The nature of the mobile telecommunications industry is changing as more and more consumers demand wireless data communications. As we discussed in Chapter 2, and as shown in Figure 21, the wireless voice value chain was fairly straightforward.

![Diagram of the wireless voice value chain](image)

**Figure 21**

Device manufacturers worked with component suppliers to design systems that they would assemble. The devices and network infrastructure equipment were then sold to network operators who would use them to deliver wireless services. The devices themselves were given or sold to end-users either directly or via retailers bundled with the wireless service itself. However, that picture has changed dramatically.

In delivering both wireless voice data services to customers, many new entrants have appeared in the value chain. These entrants have arisen because device manufacturers and network operators have been unable to offer many of the additional value-added services required by consumers. Specifically, new phones capable of accessing the Internet will have to have either some type of browser, or an operating

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system with similar built-in capability. Content accessible by mobile devices must be available to spur demand of such wireless services. The content will have to be made meaningful through the delivery of specific applications, which will also be necessary to spur demand (Figure 22). Finally, portals and application providers will have to aggregate that information for easy use by the end-user. These are the steps that will grow the wireless Web.

These steps will also create a kind of positive feedback loop where content, applications, and services will drive consumer demand (Figure 23). As more sophisticated applications like wireless video conferencing and location-based services become available, the need for higher capacity and faster networks will increase. This, in turn, will increase the demand for high-speed network infrastructure (not necessarily 3G), thereby reducing the unit cost. As the cost
drops, consumer prices will also come down making the services more attractive to more consumers.

The problem with the new value chain is that all of these new entrants are fighting for control of the customer leaving the handset makers as component suppliers to a total solution product composed of the wireless service, the device that delivers the service, the application that runs on the device, and the content used in the application. If it was unclear who owned the customer in under the old value chain, it may be impossible to distinguish in the new value chain. However, it is this very fight that will create a new industry of wireless services from wireless voice.

To compete in this new industry, Ericsson, Nokia, and Siemens must to respond to three areas of change. The first is the increased competitive environment created by e-business initiatives. Here, these companies must make internal use of the potential efficiencies created by the Internet. The second is the convergence of mobile devices. These companies will no longer be competing with just mobile phone makers, but PDA, laptop, and other consumer electronic manufacturers. The third is the increasing value generated from mobile applications and services. Having little competencies in this area, Ericsson, Nokia, and Siemens will have to work hard to capture the value created by new applications.

6.1.1 Taking Advantage of e-Business and e-Marketplace Opportunities

Ericsson, Nokia, and Siemens have made substantial efforts in streamlining the front ends of their value chains. For example, at the end of 1998, Ericsson introduced TTC (Time to Customer), a company-wide initiative led by the corporate function Supply & IT, in an effort to reduce customer lead times. It has used Internet technologies to
match supply and demand, and to create simpler (and thereby faster) ordering routines for its customers. In addition to simplifying the ordering process, Ericsson is providing its customers better information about their orders once placed. The end result has been a 50% reduction in turn around time, and a 25% reduction in supply chain personnel. However, they have done little in integrating the back end.

Siemens has also begun using the Internet to streamline the front end of its supply chain. Publicly announced at the beginning of 2000, Siemens launched an encompassing e-business and services offensive. Within a short period of time the company intends to generate one quarter of its total sales online. Siemens also sees tremendous growth potential in services and, which will soon account for fifty percent of its business. However, Siemens too seems to be focusing on the front-end of their valve chain. Making it easier for customers to purchase equipment may reduce some costs and, at best cause an increase in revenues. Yet, it is only half of the solution.

None of these companies have made significant headway in streamlining the back ends of their supply chains, thereby making it easier for purchasing departments get parts from their thousands of suppliers. This is a serious problem as Nokia and Ericsson both experienced product release delays as a result of supplier delays.

Many companies have made the transition from e-commerce to e-business to e-marketplace. The automotive industry, in particular has made this transition fairly quickly with the announcement of the unnamed Ford/DaimlerChrysler/GM e-marketplace that occurred on February 25th of this year. The rewards for making this transition will be great, and will come by cutting transaction costs, aggregating buying power, and lowering overall costs through market efficiency. Goldman Sachs research shows that
virtual markets like this will reduce product costs anywhere between a 2% and 39% depending on the commodity-like nature of the industry.\textsuperscript{52} For the communications industry, these cost savings might be as much as 15%. But for the electronic components that are used in the handsets, potential savings may be as much as 29% to 39%.

The inclusion of the Internet in streamlining their value chain should continue to be a high priority for handset manufacturers. While not as glamorous as providing WAP enabled devices or the applications that run on those devices, taking advantage of e-business and e-marketplace opportunities could have a dramatic impact on the bottom line for these companies. If Ericsson could reduce its cost of sales by 30% (as estimated above), it would increase its 1999 earnings per share by approximately 311% going from 6.17 SEK to 25.38 SEK.

The formation of a telecommunications equipment e-marketplace through a joint venture including many of the handset manufacturers would be one way in which to encourage those cost savings. Thousands of such virtual online markets have sprung up over the past year. Many of those have been formed by the giants of the particular industry in an effort to head off competition from independent online markets such as those backed by the Internet Capital Group (ICG), Ariba, or CommerceOne. Such a joint venture could eventually be spun out much the same way in which American Airlines spun off Sabre. By including many large buyers, the venture would easily gain a critical mass in a self-reinforcing cycle as seen in the figure above. Ultimately, it would also allow these companies to collect a piece of the $4 trillion that is expected to

turn over in B2B e-commerce by 2003.\textsuperscript{53} In the end, by connecting suppliers with the telecom buyers, the spinout has the potential to create more total value than the parents who created it, as was the case with Sabre.

However, this may not be as easy as it seems. First, the suppliers, specifically, the handset chipmakers, hold a significant amount of power in the industry. Qualcomm, for example controls more than 65\% of the chipmakers' market. To make matters worse, demand has far exceeded supply over the past two years, and this looks as if it will continue. Therefore, a supplier driven e-market may be more realistic.

\textbf{6.1.2 The Convergence of Mobile Devices}

The second area for change will come with the convergence of wireless devices, and the convergence of voice and data. Current mobile phones are not equipped to handle the data transfer that will be demanded by users of the wireless Internet. Displays are too small, input is too difficult, and data transfer rates are too slow.

However, many companies are already beginning to address these problems. Palm's mobile PDA, the Palm VII, already gives its users access to the mobile Internet, allowing them to check stock quotes, access e-mail, and use mapping services—all on a device with a large display and handwriting recognition input. While devices like this have yet to integrate voice services, mobile phone makers have yet to adequately integrate data services. This convergence will create an environment with many new entrants. Mobile handsets manufacturers will, in the future, not only be competing against others phone makers, but also manufacturers of PDAs and other consumer electronics.

There will also be a collision of wireless services with other appliances traditionally not associated with wireless communication. This trend will provide wireless access to automobiles and household appliances, for example. The automobile may become its own wireless local network. Imagine a situation where the car's computer recognizes that it is time to change the oil. One could use Bluetooth technology to automatically check your schedule on your PDA, wirelessly connect to the service station's network, and, using rules-based scheduling, automatically reserve a service call in both calendars. Taking this one step further, the PDA could be programmed to automatically place a call to your mobile phone reminding you of the appointment the day before. Similar applications can applied to other every-day appliances such as dishwashers, televisions, and home energy systems. There are also a myriad of business applications that would connect field sales and service people with their corporate networks. Applications using wireless are as endless as those using the Internet.

Certainly all three companies have identified this trend and have made efforts to develop their own integrated voice and data-enabled devices—Nokia being the first with its Communicator released in 1997. However, all three will come under increased competitive pressure as phones become commoditized and new players enter the market. Of the three, Nokia is probably in the best position to continue to as a market leader in handsets. Not only has it done an excellent job in building it brand, it has made many important strategic partnerships that will help remain a market leader. For example, in October 1999, Nokia and Palm Computing Inc. announced a joint development and licensing agreement to create a new category of pen-based wireless
communications devices integrating mobile telephony with data applications, information management features, and value-added services. It has covered its bets by joining the Symbian partnership giving it access to develop devices based on Psion’s EPOC operating system.

However, the power held by the chipmakers may cause problems for Nokia, who relies heavily on handsets for the majority of its revenue. Delays in releasing new handsets for any reason could be devastating to its market capitalization. To combat this, Nokia could do one of two things. It could focus on a few suppliers in an effort to gain a kind of favored buyer status. In order to do this, it would have to work with one or a very few suppliers to build close relationships. Nokia would most likely have to give them exclusivity contracts as well as advanced orders for a large of chips—neither of which would be huge concessions given the trends in demand. The second option for Nokia is to continue its vertical integration of handset chips. Currently, Nokia holds a 12% market share. By building internal capacity it could not only insure supply, but also provide the market with an alternative other than Qualcomm for GSM chips. However, Qualcomm’s intellectual property rights surrounding CDMA would still force Nokia to either license that technology or continue purchasing the chips from Qualcomm in order to get the chips needed for American CDMA phones.

The threats for Nokia here are clear. Although Nokia has done a great job in marketing, building brand recognition, and segmenting its market, it has few appropriable assets. Others in the industry have recognized the importance of name recognition and are quickly building brand awareness. Furthermore, others can easily copy Nokia’s market segmentation strategy. As devices converge, Nokia must continue
to build its brand, but must also be prepared to compete head-to-head with other consumer electronics companies. To accomplish this, they must stay at the forefront of mobile devices with large investments in product development and partnerships with other device companies like Palm.

Ericsson has entered similar partnerships for many of the same reasons. In addition to joining the Symbian partnership, it has formed a separate company with Microsoft to develop wireless devices based on its WindowsCE operating system. Many see this as an effort to balance the power in the handset operating system segment. Should Psion become the dominant player of handset operating systems or browsers, it might be possible for them to control what goes on the handsets in much the same way Microsoft controls what goes on the desktop.

Nonetheless, Ericsson faces more difficulties than Nokia in capitalizing on the handset market. The main reason for this lies in Ericsson’s marketing efforts. Over the years, Ericsson has done little in the way of direct consumer marketing to promote its handsets. As a result, Ericsson does not have the same brand recognition, and is mainly considered a network infrastructure company—not a handset manufacturer. It has essentially relied on the network operators to market their devices for them. According to those at Nokia, it takes 25 years to build a strong worldwide brand. Should Ericsson continue to focus on consumer devices, it will need to begin direct marketing efforts and pull demand through the network operators. It looks as if it has already begun to do so as it has increased selling expenses in 1999 from 14% to 27% of sales.

Siemens is in a similar position as Ericsson. It too has done little to market its handsets and has relied heavily on the network operators. In the United States, the
situation is especially bad, as many Americans do not even know the company, much less the fact that they make mobile devices. The situation is further complicated by the proliferation of standards in the United States. Unfortunately, that many not change for several years. Therefore, if Siemens is serious about becoming a major player in the wireless Internet in the U.S., it will have to not only have to build a brand from scratch, but also invest in developing phones that work on the various networks.

However, Siemens is also in an interesting position. It is entering as an industry attacker, and has the opportunity to build its wireless division by looking to the future market. This would give it the opportunity to leapfrog both Ericsson and Nokia. It has already taken steps towards this approach. By investing heavily in helping China build its next generation network, it has secured a strong position in the infrastructure market in Asia. Furthermore, it has used this as a testing ground for the implementation of 3G networks. It must do the same in North America.

It also has other opportunities not available to Ericsson or Nokia in the area of converging wireless devices, specifically in the area of wireless appliances. Siemens has divisions that sell all types of household appliances and industrial machinery. Through a close working relationship with Siemens wireless division, these divisions would be in an excellent position to have first mover advantage in developing and releasing wireless appliances. Such first mover advantage would also give the company the opportunity to explore opportunities for revenue generation with services based around such appliances. For example, higher service margins could be achieved by selling industrial equipment that contacts its service departments via a wireless connection only when problems arise.
6.1.3 The Increasing Value of Mobile Applications and Services

The wireless Internet will also create new opportunities for creative revenue models by delivering new applications and services. As we saw from the value chains above, these mobile applications and services will become an increasingly important part of the value created by the mobile revolution. Much the same way in which the operating system, software, and Internet services became the areas of value creation for the PC; the operating system, applications, and services—not the devices—will become the areas for value creation in the wireless future. It will be critical that the companies we examined begin to capture some of this value. However, this will not be easy, for few have the necessary appropriable complimentary assets.

As makers of handsets and infrastructure, Ericsson, Nokia, and Siemens currently have no mechanism for directly collecting revenues from end users. All revenue currently goes through the network operators who sell devices purchased from the handset manufacturers along with value-added voice services. When data becomes available over mobile networks, customers will continue to pay network operators for access to voice and data services in much the same way consumers pay Internet service providers for Web access. This could give them tremendous power in filtering the content that comes across the new devices.

As seen Figure 24, two potential futures exist for the way in which end-users reach wireless applications. The first is that devices are preprogrammed with links to corporate partners with icons on the mobile device’s operating system. Here, the wireless operators would fight with the device makers and the operating system owners for control of what content consumers have access to. In the second scenario, end users would have access to multiple applications and wireless content (in much the
same way people interact with the Web) through a WAP browser installed in the phone. In this case, no one (i.e. the network operator, device maker, or the operating system owner) would have control over the content and applications, and users would have total access to all material on the wireless Web.

Currently the device makers, but more specifically the makers of the device's operating system, have the capability of creating the former scenario by controlling the icons that are displayed on the phone. Should an applications provider like MapQuest want to deliver services to mobile phones, it would currently have to team up with a network operator who would then purchase phones with icons with direct links to MapQuest's Web site. Handset manufacturers have the capabilities of making these relationships, thereby generating revenue essentially as toll collectors, and many have begun to do so. However, as the environment changes, devices will come with browsers allowing users to access content in similar ways in which they access Web
content. This is depicted on the right in the figure above. Palm has already started
down this path allowing users to down load applications on to its wireless Palm VII
device. Companies like AvantGo provide wireless updated content from companies like
The Economist magazine to those devices. As this becomes more popular with
consumers, it will be necessary for handset makers to gain appropriability through the
delivery of similar value-added services.

Because this industry is so new and relationships are in a constant state of flux,
companies like Siemens have the ability to create such new services without alienating
network operators, as has happened with Nokia, for example. Siemens could use GPS
capabilities of its devices to offer location marketing. As a customer walks into a mall,
partner stores could send messages to his or her phone alerting the customer to special
discounts or sales being held. By delivering the service, partner stores would pay
Siemens for delivering the technology, while making the network operators because of
the increase phone usage.

6.2 Final Thoughts
The wireless future is rapidly approaching, and while the delivery of all services
such as wireless video conferencing may take as much as five years, the consumer and
business markets have begun to see the potential. They will continue to drive demand
for mobile services and the devices and networks that are associated with them.
However, the threat for the mobile handset makers is that they will become what the
computer makers of the PC revolution were—assemblers of hardware. The bottom line
for these companies is that they must take a bigger role in delivering services up and
down the value chain. In doing so, they will strengthen their position and build brand
awareness with end consumers.
However, network operators will not go quietly, especially after having spent hundreds of billions of dollars on 3G licenses and network hardware. They will be fighting for many of the same evolving spaces of wireless applications and services. Handset makers, like Ericsson and Nokia, though have already begun to recognize this and through partnerships, equity investments, and acquisitions, have made critical steps to ensure their long-term future. New entrants like Siemens have the potential of doing the same thing and in the end leap-frogging incumbents like Ericsson and Nokia by providing total wireless solutions to businesses including the network infrastructure, mobile devices, and associated services.

In the end, the wireless Internet will change our lives as much as the wired Internet has, and those companies who have made a commitment to delivering it to the world will ultimately see success over the next five years.

Ala-Pietilä, Pekka, President of Nokia. Interview on March 24, 2000.


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