

THE WIRELESS MARKET IN THE USA

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INTRODUCTION

A combination of telecommunications market liberalization, technological advances, and the proven benefits of wireless communications have fostered price competition and has transformed the cellular service from a luxury item to simply a commodity. Nevertheless, wireless markets differ broadly from country to country as well as from region to region. The markets in Western Europe, North America, and Asia Pacific (especially Japan, Hong Kong, and South Korea) currently enjoy wireless penetration rates of over 45% - close to an expected saturation level. The less developed markets are made up of the wireless markets in Latin America, Eastern Europe, Asia-Pacific, Africa and the Middle East – with penetration rates around 15% and promising growth in the coming years. Different stages of growth require different strategies for each region, i.e. strategies for mature and developing markets. There are three consistent differences in

performance between the US mobile market and mobile markets abroad.

First, mobile penetration is significantly higher in Western Europe and parts of the Asia – Pacific region than in the United States¹. Second, average minutes of use per subscriber are significantly higher in the USA than in Western Europe and parts of the Asia-Pacific region. Third, revenue per minute, a commonly used proxy for prices, is lower in the USA than in Western Europe and parts of the Asia-Pacific region.

All this evidence suggests one important thing – the wireless industry in the USA is the most competitive and this translates into lower prices and higher usage rates for customers. Given the attractiveness of the pricing and packages offered by mobile operators in the USA, the wireless usage per subscriber is stimulated and thus greater substitution of wireless calls for landline calls is present in the mobile market in the USA compared to the Western Europe. It is estimated that in the USA the wireless has displaced about 30% of total wireline minutes. Another interesting fact that needs to be mentioned is the choice that the customer in the USA has when it comes to mobile services. 270 million people or 95% of the total US population have three or more different operators offering mobile telephone service in the counties in which they live. Over 236 million people, or 83% of the US population live in counties with five or more mobile telephone operators competing to offer service.

In the USA there are 25 large carriers offering services in a market environment that does not allow any single carrier to act anti-competitively in the market place. Six of them are nationwide (AT&T Wireless² – TDMA/GSM, GPRS, Sprint PCS - CDMA, Verizon Wireless - CDMA, T-Mobile – TDMA/GSM, GPRS, Cingular Wireless – TDMA/GSM and Nextel – iDEN), i.e. they all offer service in at least some portion of the western, Midwestern, and Eastern United States. Each of the six national operators has networks covering at least 200 million people. In addition to the nationwide operators, there are a number of large regional players, including ALLTEL Corp., Western Wireless Corp., US Cellular Corp. and Dobson.

Table 1, International Comparisons of Cellular Service

Country	Penetration (%)	Share of prepaid	MOUs	Revenue per Minute (\$)
USA	49	5	458	0.12
Canada	37		270	0.11
UK	85	69	132	0.22
Germany	72	54	72	0.29
Italy	93		121	0.20
France	63		156	0.20
Finland	85		148	0.24
Japan	62	3	170	0.30
South Korea	68	1	296	0.10
Australia	68		173	0.18

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To Our Subscribers

This article is one of a series of Special Editions the editors of the Regional Economic Review will publish on issues that matter to our State, region and nation as a whole. Earlier special editions have focused on the Coal Industry, Natural Gas, Transportation, Workers' Compensation and Tax Reform. This edition focuses on wireless telephony in the United States with international comparisons. This is an issue that has enjoyed and will continue to experience considerable concern in West Virginia, but is largely unaffected by our State policies. Accordingly, this paper is business focused with an outline of issues that matter to providers of wireless telephony. This work was written by Cristina Sandu, a Research Associate with the Center and recent graduate of Marshall University's Master's of Business Administration Program. Ms. Sandu's work at the Center has involved analysis of wireless and broadband telecommunications as part of several projects at the Center.



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Market figures clearly indicate, even for the largest carriers, that any attempt to raise prices and/or adversely affect the service quality would be readily followed by market share loss as customers would leave them. The most *important metrics* in the industry are: service availability, subscribership, average revenue per unit (ARPU), usage, churn (the number of customers an operator loses over a given period of time), pricing, service innovation. Regarding the rural areas, the FCC reports conclude that even if there is a smaller number of

Table 2, Mobile Telephone Operators in 2002(in 1,000's)

Operator	Total number of subs
Verizon Wireless	32,491
Cingular Wireless	21,900
AT&T Wireless	20,900
Sprint PCS	14,760
Nextel	10,612
T-Mobile	9,913
ALLTEL	7,600
US Cellular	4,103
Leap Wireless	1,512
Western Wireless	1,197

operators serving rural areas than urban areas, effective cellular operator competition exists in rural areas. Also, the average price of mobile telephone service in rural areas is very similar to the average price in urban areas. Another very interesting characteristic of mobile operators in rural areas is that they enhance competition not only in the mobile telephony market but also in the wireline market, benefiting customers by increasing customer choice, offering innovative services and introducing new technologies. Recent trends in the industry are driven by sales and swaps of licenses in order to increase network capacity and coverage, joint ventures for infrastructure sharing and collocation and affiliations through which a "family" of operating companies with much closer relationships than those formed by traditional roaming agreements.

The wireless penetration in the USA is roughly 49% of the population, wireless subscriptions are growing 13% a year – just ½ the pace of a few years ago. Analog cellular networks cover 99% of the US population and 75% of the US geography making cellular the most extensive terrestrial technology available.

If the market for voice has already reached maturity in some parts of the world, the market for data has soon taken off with promising forecast, despite its recent sluggishness caused by inherent technical problems, high service prices and spotty

geographic coverage. The number of wireless data subscribers in the United States – both business and consumer – will soar from 8.4 million in 2001 to more than 52 million in 2005. There are already strong signs that the business market is ready to rapidly adopt wireless data service. The advent of next generation (2.5/3G) networks has become instrumental in providing higher speeds that will make better, more dynamic applications possible. As voice revenues become increasingly marginal, mobile data services offered over cellular and PCS networks are becoming more prevalent in the enterprise space. Revenues from mobile data first will be generated from the enterprise space followed by a strong market push into consumer market. Wireless carriers now offer a suite of data and messaging services in addition to the standard voice service. Data offerings are expected to proliferate and eventually represent a significantly larger portion of average revenue per user (ARPU). Wireless carriers must make very important decisions concerning migration to 3G networks. There is one question that appears to be relevant: Will the end-user be able to "feel" the difference in network speeds between 2.5G networks and 3G networks considering that the operators will feel it financially?

There is a market potential of 37.3 million mobile data³ subscribers. Of the different occupations, executive, administrative and managerial occupations had the highest market potential for mobile data applications. Cellular/PCS/ESMR operators will garner over 60% of mobile data users, significantly more than the paging, dedicated data, and mobile satellite operators. Significant growth in annual services revenues is expected starting in 2004, as narrowband subscriber growth slows and higher-priced broadband services begin to experience considerable subscriber growth.

Satellite Communications fall under mobile telecommunications services category. They offer the advantage of providing universal coverage in less urban areas, which are underserved by terrestrial wireless networks. While several mobile satellite communications operators have found themselves in deep trouble (Iridium went bankrupt, Globalstar has found itself in financial troubles), there still are several that believe the market will be viable enough to lead to long-term success. With the difficulty satellite voice services have had in obtaining substantial revenue, many satellite operators who have concentrated on providing voice services, such as Globalstar, are beginning to offer data services as well. To date, there have been few signs that the market for satellite data services is large enough to support the number of satellite operators who are looking to penetrate it.

KEY FINDINGS:

Strong cellular/PCS⁴ subscriber growth will persist in the near-term and gradually slow its pace over the next decade.

Carrier consolidation has accelerated in the cellular/PCS marketplace.

The revenue paradigm is shifting as data revenue begins to have a positive impact on monthly average revenue per unit (ARPU) figures.

Pricing schedules across cellular/PCS carriers have become increasingly complicated.

The total number of digital subscribers have begun to overtake the total number of analog subscribers.

Higher penetration rates into younger and less affluent market segments are occurring due to more competitive pricing plans.

The idea of cellular-based mobile radio services was formulated in the USA at Bell Labs in the early 1970s⁵. The diffusion of 2G began in January 1992, when the first wireless digital telecommunication network was opened in Finland. At that time, eight analogue mobile telephony standards were active in different parts of the world. Analogue mobile telephony used scarce radio frequencies of the radio spectrum inefficiently and, given the limited spectrum available for operators, competition among analogue mobile telephone operators never really took place. The first generation of mobile telephones never reached high levels of penetration. The launch of digital mobile telephony meant a drastic increase in the efficiency of spectrum use and in service quality. Digitalization facilitated the introduction of new services (e.g. Short Messaging Services) and led to increased consumer privacy. Simultaneously, regulators allocated more frequency spectrum for mobile communication services.

HISTORY OF WIRELESS TELEPHONY

Mobile Telephone System

1981	NMT 450 (Nordic Mobile Telecommunications System)
1983	American Mobile Phone System (AMPS)
1985	Total Access Communication System (TACS)
1986	NMT (900)
1991	GSM (Global System for Mobile Communications)
1992	DCS 1800 (Digital Cellular System)
1994	PDC (Personal Digital Cellular)
1995	PCS 1900 Canada
1996	PCS (USA)

The major advantages of the digital services⁶ are the following:

- increased capacity, which translates into increased number of subscribers;
- better sound quality and increased spectral efficiency;
- enhanced privacy;
- reduction of cellular fraud.

The main digital technologies used in the United States are: Code Division Multiple Access (CDMA⁷), Global System for Mobile Communications (GSM), integrated Digital Enhanced Network (iDEN) and Time Division Multiple Access (TDMA⁸). These four technologies are commonly referred to as Second Generation (2G) because they succeeded the first generation of analog cellular technology. Beyond the 2G technologies, mobile telephone carriers have been deploying next generation network technologies that allow them to offer mobile data services at higher data transfer speeds and in some cases, voice capacity. These technologies are GPRS (General Packet Radio Service), EDGE (Enhanced Data Rates for GSM Evolution) and eventually Wideband CDMA (WCDMA) also known as UMTS (Universal Mobile Telecommunications Service). To date, 278 million people or 97% of the total US population live in counties where operators offer digital mobile telephone service using TDMA/GSM, CDMA or iDEN or a combination of three. These counties make up 71% of the total land area of the United States.

Table 3, Mobile Telephone Digital Coverage

<i>Technology</i>	
Technology	% of total square miles
CDMA	51.3%
TDMA/GSM	53.5%
IDEN	35.9%
Total digital	71.4%

Regulatory aspects

Except for the spectrum allocation issues there is no intervention by the state or local authorities as far as cellular operations go. Entry is regulated but not the prices. Virtually all public networks in the US, communications and others, are subject to regulation by government agencies. The two main economic reasons advanced for market intervention are: (a) the belief that such networks constitute a natural monopoly for which competition is not feasible and regulation is therefore necessary to control monopoly power and (b) to achieve

“universal service” in which all (or most) citizens have a low-cost access to the services of the network. US cellular and PCS telephone networks, which exist in each major city, are an exception to this rule. While frequencies that these wireless systems use are regulated (all radio frequency usage is allocated by the Federal Communications Commission) and therefore entry is regulated, prices are not regulated. (Faulhaber and Hogendorn). Also, the FCC mandate that all carriers must maintain analog service in every market, therefore analog networks will continue to exist for the foreseeable future, but they will not compete with other wireless technologies in the consumer markets. Due to their extensive coverage and low cost, analog networks will be able to compete effectively for applications requiring slow-speed data transmissions. Digital cellular and PCS technologies have a distinct advantage over analog technologies with respect to data applications. As the market for wireless data evolves and migration to the third generation (3G) technology will be a must for survival in the market, additional spectrum will be an obstacle for some carriers as they move to full-fledged 3G networks. Spectrum remains a key issue surrounding the proliferation of 3G networks. 2.5 G interim solutions appear promising because substantial (additional spectrum and new base stations) outlay is not required.

THREATS AND OPPORTUNITIES FOR WIRELESS OPERATORS:

1. Rodini and Ward empirically confirmed that second fixed line and mobile services are substitutes for one another. But while impediments to easy substitution like connection quality and number portability (not anymore!) remain, the discrepancies between the two services are fading. Substitutability may increase over time due to continued price declines and feature improvements of mobile services outpacing those of fixed line service.

2. Even if mobile data constituted only 1.7% of mobile telephone carriers’ total ARPU and revenue during 2002, up from 7.6 million, the consumer adoption of various data products is growing.

3. Threat – number portability, which is to be effective November 24th, 2003 poses a serious threat to mobile operators since it makes it easier for customers to switch mobile service providers in an industry already seriously challenged by the customer retention problem. Despite the existence of various barriers to switching, such as yearly service contracts, inoperability of phones across providers, steep termination fees, the industry still suffers from high churn rates. Therefore, higher levels of satisfied customers, typically have lower churn rates. The need for a better customer retention policy can be further enforced by adding that the cost of acquiring new customers is between \$300 to \$ 475. Research has led to the conclusion

that dissatisfied customers have a 17 times greater chance in switching propensity that satisfied ones. Dissatisfied customers are a threat for the operator providing unsuitable services and an opportunity for its competitors.

4. *Wireless prepaid market* can constitute an opportunity for mobile operators in their attempt to make wireless phone usage a more appealing option to a larger percentage of the population like the youth market, ethnic minorities and the credit-challenged. However, to make prepaid a successful product offering, carriers must adjust some of the dynamics of prepaid wireless. In most existing prepaid relationships, carriers do not have regular contact with their customers. In fact, carriers do not even know who approximately 50% of their prepaid subscribers are and this makes it difficult to develop long-lasting relationships with subscribers, and carriers must continually work to increase ARPU and reduce churn. Therefore, in order to eliminate the detrimental effects of pure prepaid, a hybrid solution that enables stronger customer relationship with subscribers must be found.

POLICY RECOMMENDATIONS FOR CELLULAR OPERATORS:

Adequate investment in the back-up infrastructure is imperative – see the recent black-out in New York City – operators did not have enough back-up generators to keep base stations going (estimates suggest that 30% of New York cell sites were out of action the following day). The only New York operator, T-Mobile, had a Wireless Priority Service system in place to give instant access to emergency services, a system supposed to have been implemented by all operators after September 11th.

RECOMMENDATIONS FOR CELLULAR/PCS CARRIERS ARE AS FOLLOWS:

- Differentiate service offerings;
- Create flexible pricing plans;
- Maximize existing infrastructure;
- Implement a strategic consolidation plan;
- Focus on core competencies;
- Avoid over-inflating user expectations;
- Maximize the new and existing customers’ lifetime value through Customer Lifetime Management (CLM);
- Improving Customer Service experience for the customers as customer satisfaction levels increase a full 5% over initial levels if subscriber’s problems/issues are resolved in a timely manner.

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(FOOTNOTES)

¹ Mobile penetration rates for North America are still surprisingly low compared with the European and Asian markets. Fragmented mobile markets in conjunction with a relatively cheap, reliable landline service, have yielded few incentives for adopting mobile services until only recently. As a result, both infrastructure and wireless service rollouts have been slower in North America than other major markets. Both the USA and Canada lag significantly behind other developed countries in the world in terms of mobile telephone adoption.

² AT&T Wireless announced in December 2002 that it plans to launch WCDMA in four US markets – San Francisco, San Diego, Seattle and Dallas by the end of 2004.

³ Mobile data service is considered to be the delivery of non-voice information to a mobile device.

⁴ PCS is the group of the 3 digital cellular telephone technologies in North America: CDMA, TDMA and GSM 1900. PCS refers specifically to 1900 MHz frequency technologies, CDMA is the most advanced of the three digital technology standards used worldwide. PCS is the generic name for the new digital networks that are being rolled out through North America.

⁵ The first mobile phone was invented by Martin Cooper in 1973.

⁶ 88% of all wireless subscribers use digital service.

⁷ CDMA is now the market leading mobile network platform in North America. CDMA – developed by Qualcomm, San Diego.

⁸ TDMA (the first US digital standard developed, the first TDMA commercial system began in 1993) – GSM is based on it.

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