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## iPod vs. Cell Phone: A Mobile Music Revolution?

*Phones are on the verge of becoming computers that can do anything a desktop PC can, only you get to carry it in your pocket. All you need to do is increase the memory capacity of mobile phones so they can hold as many songs as an iPod and the mobile will become the device of choice. It's not going to happen overnight, and the iPod and mobile will co-exist for a while. But we're at a tipping point where we'll start seeing the mobile take over.*

—Ralph Simon, President of Mobile Entertainment Forum, 2005

On September 7, 2005, Apple, Motorola, and Cingular Wireless announced the launch of the Motorola ROKR, the first mobile phone that offered compatibility with Apple's highly touted iTunes music service. At first glance, this teaming of three industry leaders threatened to shut competitors out of the new frontier of mobile music. By April 2006, Apple had shipped 50 million iPod digital music players since the product line debuted in 2001, and had recently sold its one-billionth song through iTunes.<sup>1</sup> Furthermore, the release of the ROKR aligned Apple with the leading North American players in both mobile phone manufacturing (Motorola, with a 36.4% market share) and wireless service (Cingular, with a 32% market share).<sup>2,3</sup> Despite media hype, however, sales of the ROKR fell far below expectations.<sup>4</sup> Critics panned the device for its high price (\$250), its low memory capacity, and its incompatibility with non-iTunes services. According to reports, the capacity limitation—the ROKR stored just 100 songs—grew out Apple's fear of iPod cannibalization.<sup>5</sup>

This unsuccessful marriage of corporate giants created more questions than answers about the emerging field of mobile music, which promised to turn the mobile phone into the music device of choice. Although the iPod accounted for more than half of the rapidly growing market for portable music players (projected to grow at a 33% CAGR to 165 million units by 2010), the convergence between handsets and music players threatened to undermine Apple's competitive position.<sup>6</sup> A quarter of the world's population already owned a mobile phone, and one analyst predicted that by 2008, half of the 860 million cell phones sold worldwide would be able to store and play songs, up from 8% in 2005.<sup>7</sup> Leading U.S. mobile operators (also referred to as carriers) salivated at this potentially massive opportunity.

Mobile carriers Cingular, Sprint-Nextel, and Verizon Wireless had each launched mobile music services in late 2005, but none of those services had made a significant impact on the broader digital music market within its first six months of operation. The carriers faced nagging strategic questions with respect to their approach to industry partnerships, their underlying technology platforms, and their pricing strategies. In mid-2006, industry experts continued to debate whether mobile operators would be able to topple Apple from its dominant position within the digital music ecosystem. Many

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believed that carriers, by developing mobile music as a major new market, would be able to offer a truly superior value proposition. Others argued that Apple, building on its history of innovation and strategic nimbleness, would meet this challenge and retain its leadership.<sup>8</sup> (See Exhibit 1—Digital Music Ecosystem.)

Against that backdrop, technology giants such as Microsoft and Google were also exploring strategies to address the digital music industry. Microsoft had already made its presence felt in that industry through its Windows Media platform and its MSN Music store, and the release of its long-rumored iPod competitor was imminent. Now Microsoft had to decide whether and how it should leverage those and other assets—such as its Windows Mobile OS—to expand into mobile music. Google, over the prior year, had expanded its scope as the leading Internet search engine by aggressively entering adjacent businesses, and observers speculated that it would use its ever-expanding online properties and its strong advertiser relationships to launch a compelling digital music offer.

In addition to the strategic questions that each of these major players faced, broader industry-level questions loomed. Had Apple already captured the digital music market, or did mobile music represent a new, potentially revolutionary opportunity? In light of relatively slow consumer adoption to date, what would it take for mobile music to captivate a critical mass of consumers? Which players, given their very distinct strengths and weaknesses, were in the best position to capitalize on the mobile music opportunity? And how could they monetize that opportunity most effectively?

## Mobile Music History and Industry Overview

### *Origins of Digital Music and the Rise of Apple*

The digital music revolution began with the creation of the MP3 file format in the early 1990s. MP3 files provided high-quality sound while requiring dramatically smaller file sizes than previous formats. An entire ecosystem of complements soon surfaced around this technology, including online music software and portable MP3 players. Early on, music downloading from the Internet consisted largely of illegal use of free, peer-to-peer file-sharing sites like Napster and Kazaa. Illegal file sharing slowed dramatically after the music industry took aggressive legal action against these sites—for example, by forcing the shutdown of Napster in 2001.<sup>9</sup>

Over the next few years, many players raced into the digital music space, including retailing giant Wal-Mart, media technology leaders RealNetworks and Microsoft, and top Internet portals such as Yahoo! and AOL. By 2004, Apple had gained a leading position as a result of its early mover advantage, its 99-cents-per-song pricing, its use of software that offered security to music labels and ease of use to consumers, and, of course, its ultra-hip iPod. In fact, Apple used iTunes as a loss leader for selling the iPod.<sup>10</sup>

Despite Apple's dominance, competitors fought aggressively to gain market share and to break Apple's stranglehold. To combat Apple's proprietary platform, Microsoft pushed its Windows Media Audio (WMA) format, a relatively open platform that was readily available to dozens of licensees and compatible with dozens of digital music players. Competitors also challenged Apple through business model innovations. Napster re-emerged and, along with RealNetworks, offered monthly subscription services for streaming music. Meanwhile, Wal-Mart and Yahoo! attacked Apple on per-song pricing. Although some of these tactics led to modest success, by the spring of 2006 Apple's share of the U.S. digital music market ranged between 70% and 80%.<sup>11,12</sup>

### *The Mobile Music Opportunity*

Once used exclusively for making phone calls, mobile phone technology in 2006 allowed users to take pictures, send text messages, store personal information, access the Internet, play games, and increasingly, listen to music. With an estimated 263 million North American mobile phone subscribers in 2006, many industry experts saw a potentially huge opportunity for mobile operators to capture value in the intersection between digital music and mobile phones.<sup>13</sup>

Mobile operators had other reasons to pursue the digital music market. Faced with shrinking average revenue per user (ARPU) in the voice service market and expensive 3G network build-outs, carriers focused on growing ARPU through new data services. (See Exhibit 2—U.S. Mobile Operators: Average Revenue Per User, 2005.) Operators had experienced an early success in the ringtone business, which allowed users to download shortened versions of songs that played during incoming phone calls. The U.S. ringtone market was projected to reach \$320 million in 2006 and to exceed \$500 million in 2010.<sup>14</sup>

**Growth projections** By most measures, the digital music market was massive and growing rapidly. Music was a \$32.1 billion industry worldwide in 2005.<sup>15</sup> Record labels still relied primarily on music CD sales, with digital music accounting for only about 7% of U.S. music revenue in 2005. However, digital music was expected to make up around 17% of total U.S. music sales in 2006 and to reach 25% of revenues by 2008.<sup>16</sup> PC-based downloads grew 167% between 2004 and 2005.<sup>17</sup> (See Exhibit 3—U.S. Retail Digital Music Market, 2004–2010.) By late 2005, iTunes had topped traditional brick-and-mortar music retailers such as Tower Records, Borders Books, and Sam Goody in music sales volume.<sup>18</sup>

Fueling much of the growth in digital music sales was the increasing popularity of portable digital music players. In 2005 digital music players outsold CD players for the first time, and Morgan Stanley forecasted that more than 70 million digital music players would be shipped in the U.S. in 2006.<sup>19,20</sup> Apple's iPod was the main catalyst for this growth.<sup>21</sup> (See Exhibit 4—Digital Music Device Shipments, 2004–2010.) Several consumer electronics firms and small specialized players had entered this market, including Creative, iRiver, Philips, Samsung, Sony, but none had yet proven to be a serious threat to the iPod.

Mobile operators were very optimistic about this new market. While they initially worried about cannibalizing their ringtone business, carriers concluded that mobile music had by far the highest revenue potential of any data service opportunity.<sup>22</sup> Bill Stone, vice president of marketing at Verizon Wireless, noted: "From a listener's point of view, a handset could become her remote control for finding, buying, and moving music. Retail stores and iTunes don't offer the same relevance, immediacy, and mobility."<sup>23</sup>

Research on consumer interest in mobile music and their willingness to pay for it varied widely. Optimists pointed out that given the sheer scale of mobile operators—which expected to sell nearly 1 billion handsets worldwide in 2006 (including about 171 million in North America)—it was only a short matter of time until technology evolved to a point where consumers deemed mobile phones "good enough" music devices.<sup>24</sup> (See Exhibit 5—Global Handset Shipments, 2003–2009.) About 10% of global handset shipments were expected to have some degree of music functionality in 2006.<sup>25</sup> Other observers cited research that revealed apparently lackluster consumer interest in mobile music and little willingness to pay a premium for it.<sup>26</sup>

**International success stories** Markets with highly developed wireless infrastructures, such as those in Western Europe and East Asia, provided encouragement to mobile music stakeholders worldwide. Those markets were significantly ahead of the U.S. market in 3G network rollout and in

mobile data services. In the United Kingdom, industry leader Vodafone claimed its one-millionth song download after only four months of operating a music service that charged \$2.75 per download.<sup>27</sup> In Germany, mobile operator O2 teamed with handset manufacturer Nokia to launch an online music store that allowed users to browse, search, sample, and download full-length tracks directly to a mobile device or to a PC.<sup>28</sup> By 2006, nearly all major European carriers with 3G networks had some form of download or streaming music service.

In Asia, South Korea's SK Telecom aggressively entered the mobile music space with a proprietary music portal known as Melon, through which subscribers could play streaming music or download full songs for playback on their mobile handset.<sup>29</sup> By the end of 2005 (about one year after its launch), Melon had more than 4 million download subscribers and more than 600,000 streaming music subscribers.<sup>30</sup> Japan also offered an encouraging example. In late 2004, Japanese operator AU (owned by telecom powerhouse KDDI) launched the "EZ chaku-uta" full-track download service; by January 2006, the service had already logged 33 million cumulative downloads.<sup>31</sup> Telecom analysts attributed Vodafone's rapid loss of market share in Japan partly to its slow rollout of music-enabled 3G services.<sup>32</sup> Japan also boasted the largest mobile music ARPU worldwide for the "youth" market (defined as consumers aged 5 to 24), with a youth mobile ARPU of almost \$6 per month in 2005; the comparable U.S. figure was only about 50 cents.<sup>33</sup>

How applicable those experiences would be to the U.S. market was uncertain. In fact, the U.S. digital music market was more mature than its European and Asian counterparts, featuring relatively wide adoption of PC-based (as opposed to mobile-based) services. (See Exhibit 6—PC-Based Digital Music Market: Downloads by Country, 2004–2010.) Moreover, although European and Asian wireless carriers were typically the early movers in their respective digital music markets, Apple had begun to pose a serious threat to them. Apple did not launch iTunes in Japan until late 2004, yet the iPod had captured more than 32% of the Japanese digital music player market share by year's end. And by the end of 2005, the iPod had attained a 51% share—an especially impressive feat, given Japan's hypercompetitive consumer electronics market.<sup>34</sup> In the United Kingdom, iTunes reportedly controlled more than 80% of the music download market by November 2005, despite well-developed mobile music offers from Vodafone and O2.<sup>35</sup>

## Technology Building Blocks of Mobile Music

The technological ingredients for a mobile music service were numerous and in differing stages of maturity. As a result, mobile operators faced crucial decisions that would affect their long-term music strategy. They had to decide on key platform issues related to rights protection and file formats. They had to grapple with decisions regarding wireless network upgrades. Finally, they had to balance considerations of handset functionality and storage capacity against the need to control costs.

### *Digital Rights Management*

Digital Rights Management (DRM)—the technology that governed the use, distribution, and sharing of digital intellectual property—was a central issue for the digital music industry. DRM controlled which devices could play which music tracks, and whether and how often users could share music. It was especially relevant to subscription-based services, which could use DRM to suspend service because of non-payment or to limit play frequency. The major music labels supported strong and restrictive DRM and required approval of DRM standards before licensing their content. But strong DRM also risked alienating consumers, for whom these complex usage rules had already grown frustrating and confusing.

For iTunes, Apple used a proprietary, tightly closed DRM standard called FairPlay. Competing standards included Microsoft's Windows Media DRM (WMDRM) and Open Mobile Alliance (OMA), both of which were more open than FairPlay. WMDRM had achieved broad adoption after royalty disputes delayed the rollout of OMA DRM by nearly two years. Microsoft was also very aggressive in promoting WMDRM, generally giving the technology away to encourage adoption. In addition, several smaller vendors had developed proprietary DRM standards that they had optimized for mobile phones. (See Exhibit 7—Comparison of Leading Digital Rights Management Systems.) In selecting a DRM standard, carriers had to consider licensing terms, potential platform complements, value chain leverage, and the standard's ability to compete with FairPlay. They also had to weigh the impact of their choice on efforts to partner with online music stores, since incompatible DRM standards might raise up-front integration costs for both partners.

### *File Formats*

Every digital music file came in a specific format, or codec (short for "compression-decompression"). Each codec employed its own algorithm to compress and decompress data for use on music player devices. The relationship between a DRM standard and a codec, which was also a kind of standard, was significant: DRM actually came wrapped within a specific codec. Some DRM standards (such as FairPlay) were compatible only within certain codecs (ACC, in the case of FairPlay), while some codecs (such as MP3) did not even support DRM.<sup>36</sup> (See Exhibit 8—Codec Comparison and Codec-DRM Pairings.)

For wireless carriers, choosing a codec involved a major dilemma. On the one hand, maximizing the compression of music files allowed them compensate for limits on handset storage capacity. Using a codec that resulted in smaller file sizes also enabled faster downloading of music via over-the-air (OTA) delivery—a critical component of some mobile music business models. On the other hand, higher compression generally came at the expense of audio quality: The greater the data loss through compression, the more likely it was to be noticeable to the human ear. A recently released standard, aacPlus (v2), held the promise of allowing greater compression with minimal data loss.

### *Network Considerations*

The capacity and data rates of wireless networks formed a potential constraint on carriers' mobile music strategy. Older-generation networks, with their low data rates, imposed relatively long download times on end users. In addition, the data costs and capacity usage associated with OTA downloading and streaming were considerably higher on an older-generation network. By installing an advanced 3G (third-generation) network, a carrier could offer customers higher data rates, more efficient transmission, and faster download times. On a 3G network, for example, users could download a 900-kilobyte file in 1 minute at a cost of just 14 cents. Using an older 2.5G network, it would take 3 minutes and cost 55 cents to download a file of that size.<sup>37</sup> The downside of rolling out a 3G network was that it brought high implementation and network migration costs, even as consumer demand for high-bandwidth mobile applications remained uncertain.

### *Handset Issues*

Incorporating music capabilities into mobile handsets added significantly to a carrier's costs. Under prevailing wireless industry business models, carriers often partially subsidized their subscribers' handset purchases. Their goals in doing so were to increase subscriber retention, to secure more profitable long-term contracts, and to support the marketing of add-on data services.

Keeping handset costs down was therefore critical to carrier economics. But building in music-related functionality (high-quality audio speakers, headphone outlets, a robust display screen, an easy-to-navigate user interface, and so forth) clearly worked against that aim. Further increasing handset costs was the need to integrate or accommodate multiple DRM-codec platforms.

A related issue was the low storage capacity of currently available handsets, which amounted to a competitive disadvantage in any match-up between mobile phones and standalone portable digital music players. In particular, a key trade-off existed between storage capacity and battery life, and mobile subscribers were highly resistant to anything that would limit battery power. Moreover, to match the larger-capacity iPods, a phone required a hard disk, which would not only limit its battery life, but also increase its physical size and make it more prone to failure. In the short term, most handset makers turned to removable memory cards for a solution to this problem. Over the longer term (three to five years), a steady drop in flash memory prices might mitigate such trade-offs.

## Business Models and Economics

### *Key Dimensions of Business Models*

In establishing a business model that would support mobile music, companies had to consider several interdependent factors. Chief among these were music delivery method, pricing models, handset functionality, mobile-PC integration, and network interoperability.

**Music delivery method** The two major forms of digital music delivery were full-track downloading and streaming. In the former, users downloaded songs from the Internet (or from a "walled garden" site operated by their carrier), and those music files resided on users' machines. Users then either "owned" or "rented" that music. With Apple's iTunes, for example, consumers enjoyed permanent ownership of a downloaded track and could copy it onto as many as five computers. Alternatively, in a subscription arrangement, users essentially rented a downloaded track: When their subscription expired, so did their ability to play the track. DRM technology enabled vendors to control track usage in this way. Besides iTunes, services that relied primarily on selling or renting downloads included MSN Music, Wal-Mart, and Yahoo! Music.

Streaming services typically came in two forms: *on-demand* streaming, through which a user chose specific songs to play in real time; and *channel-based* streaming, in which users selected genre-based channels for continuous play. RealNetworks, with its acquisition of Rhapsody in April 2003, became a pioneer in PC-based music streaming on a large scale. Given the popularity of "owning" (or at least "renting") music, most digital music retailers that specialized in streaming also offered a downloading service. Because of its "real time" nature, streaming usually required broadband to ensure reliable service and high fidelity.

**Pricing models** The two predominant pricing schemes in digital music were the "a la carte" model and the subscription service. In 2006, a la carte download services dominated the U.S. digital music market. Indeed, between 2004 and 2005, the share of that market taken up by a la carte services grew from 66% to 76%.<sup>38</sup> In the a la carte model—exemplified by iTunes—consumers bought individual tracks for a fixed price and "owned" those tracks, subject to DRM restrictions.

Pricing for subscription services was slightly more complex. For a basic service, users paid a monthly fee (about \$8 to \$10) for access to a catalog of music that they could access only via PCs. Most services had tiered pricing, with a premium tier that gave users full portability or increased access to music (for a fee of \$12 to \$15 per month). In addition, many subscription retailers (such as

Napster and Yahoo!) also offered a la carte downloads that were cheaper than downloads from iTunes. Through DRM, subscription retailers could suspend a user's account because unpaid subscription fees. Vendors nearly always priced streaming services on a monthly subscription basis, while downloads could be priced either a la carte or on a subscription basis. (See Exhibit 9—Digital Music Subscription Services: Estimated Market Shares, 2005.)

Some industry experts contended that there was room for both models in the market. But others argued for the superiority of a la carte delivery, since it played to long-standing consumer expectations about music ownership. Most consumers, these observers suggested, were loath to spend \$15 per month on a subscription when they could cherry-pick specific songs through a la carte downloading. Rob Reid, vice president of strategic development at RealNetworks, whose Rhapsody service pioneered the subscription model, framed the adoption barrier in this way:

This (subscription service) requires a huge mental shift, which will take time. For 100 years, we've been on a sustaining technology trajectory in the music industry, introducing a series of technologies that gave us incremental improvements in capacity, fidelity, and portability. You can trace a line straight from vinyl through tape, then CDs, and then downloads. But the paradigm stayed the same: with each new technology, you still paid for an individual album or song. Subscription music faces the same problem as TiVo: you don't understand the value proposition until you experience it.<sup>39</sup>

Even so, many stakeholders were optimistic about the longer-term potential of subscription services. Rio Caraeff, vice president and general manager of Universal Music Mobile, said in 2006: "The subscription model is a generational shift. Already, fewer people are as engrained with the concept that possession equals ownership. It's really a question of whether one prefers access or possession. This shift in thinking will take some time to reach a critical mass."<sup>40</sup> (See Exhibit 10—Major Digital Music Retailers: Service Offerings and Pricing Information.)

**Handset functionality** At one end of the mobile music spectrum, the handset was a simple device through which users browsed and bought music that they then downloaded directly to a PC. Or the handset might serve as a basic storage-and-play device, into which users would "sideload" (usually via USB cable) music from a PC (as with the Motorola ROKR). At the other end of the spectrum, the handset served as both as a purchase trigger and as a content destination, with music arriving via OTA delivery. (In this case, users might be able to store a second copy of a track to their PC.) Deciding among these options had important implications for the cost and functionality of the handset, as well as for a carrier's choice of media player, DRM and codec format, and user interface.

**Mobile-PC integration** Another key issue involved the degree to which users could integrate their mobile music experience with their music experience on a PC. In one model, the handset became a stand-alone device with which users could purchase, receive, and store music, which would remain there until they deleted it. Here, with music delivered OTA to the handset, the mobile experience would be completely independent of the PC music experience. This simple approach resembled the model used with ringtone offerings. A more sophisticated service might include tightly integrated music purchasing via either PC or handset, delivery to both, and seamless transfer between the two. To make that service viable, a carrier had to ensure interoperability between the PC and the handset for both DRM and codec formats. In addition, the carrier had to determine whether to partner with an existing online music retailer or to build its own PC-based music store.

**Network interoperability** Carriers also had to decide whether they wanted to pursue an open model, which would allow customers to download music from multiple services, or whether they preferred a closed model, which would allow downloading only from their own proprietary service. In the first model, exemplified by Japan's DoCoMo, a carrier made money mostly from

network usage fees. In the second model, exemplified by Verizon Wireless, the carrier counted on building revenue through music retailing.

### *Economics*

The a la carte download business, because of its relative simplicity and its greater similarity to the traditional music distribution model, featured revenue-sharing arrangements that were more mature and more straightforward than those in the subscription business. Partly for that reason, record labels initially preferred the a la carte model. However, advances in DRM technology had made subscription services more attractive to record labels: Subscription customers did not actually “possess” content, which meant it was harder for them to engage in illegal file sharing.

In the pay-per-download model, record labels generally received about 65 cents per song or roughly 60% of a song’s retail price, whichever was greater.<sup>41</sup> Content aggregation and music distribution costs usually commanded about 15% of the retail download price.<sup>42</sup> After accounting for fixed operating and marketing costs, very little profit remained for online retailers. Many players subsidized their download business through higher margins on subscription services (as with Yahoo!) or hardware sales (as with Apple).

For subscription services, vendors developed complex algorithms that determined revenue sharing according to the exact type of service and how many times a specific track was played. In general, music labels received either a per-stream royalty with a cap (“pay per play”) or a fixed minimum payment per subscriber. Industry experts estimated that the labels’ share accounted for 50% to 60% of a monthly subscription fee.<sup>43</sup> Variable operating costs (such as fees for credit card transactions and content aggregation) were generally lower on a per-subscriber basis than they were under an a la carte plan. As a rule, though, fixed costs were higher for subscription services than for a la carte services.<sup>44</sup> (See Exhibit 11—Digital Music Economics by Service Model.)

The choice of delivery mechanism (streaming or download) greatly affected the economics of mobile music. The economics of streaming depended largely on data costs incurred from bandwidth usage. Because data streaming costs to the carrier were a function of subscribers’ usage, the risk to carriers of charging a fixed monthly subscription fee for unlimited streaming was high. At the same time, users were unlikely to adopt a pay-per-play model that charged them a fee for each music stream. With older-generation networks, in particular, high carrier data costs and service reliability problems undermined the business case for streaming.

In the case of mobile OTA downloading, carriers could more easily price downloads on a cost-plus basis. Here too, however, data costs and long download times associated with older-generation networks threatened to reduce customer satisfaction and to lower carrier margins. (See Exhibit 12—Theoretical Economic Models by Service Offering.)

## **The Mobile Music Value Chain**

In 2006, several value chain segments made up the mobile music market: record labels, platform vendors and white-label music services, online music stores, handset makers, and mobile operators.

### *Record Labels*

As content owners, the major record labels enjoyed significant leverage in the value chain. In fact, the four major labels—Universal Music Group, Warner Music Group, EMI, and SonyBMG Music Entertainment—controlled about 75% of the legal music market in the United States.<sup>45</sup> However, as digital music began to cannibalize traditional CD sales, the labels became increasingly reliant upon Apple, the largest distributor of digital music. Many music industry leaders believed that Apple, by pricing music at 99 cents per track, was undervaluing their content and establishing unrealistic consumer expectations.<sup>46</sup> Not surprisingly, the labels were open to exploring new business models with mobile operators. In any such relationship, they would likely insist on higher retail prices than those charged by Apple.

The elimination or reduction of illegal downloading remained a primary objective for music labels. In the first quarter of 2006, even as Apple reported its one-billionth song download, consumers illegally downloaded an estimated 1 billion songs worldwide *every month*.<sup>47</sup> Sites like AllofMP3.com in Russia, for example, exploited quasi-legal loopholes to offer content for about one-tenth of the U.S. retail price.<sup>48</sup> But while music labels continued their battles in the courts, they increasingly shifted their focus toward promoting legitimate online services. Embracing and leveraging DRM technology was essential to this effort. By 2006, the labels had approved a healthy number of DRM-codec platforms for use by mobile operators.

### *Platform Vendors and White-Label Music Services*

Niche vendors had emerged to occupy various intermediate links in the mobile music value chain. These players fell into two broad categories: mobile music platform vendors, and PC-based white-label music services. The former, which emerged specifically to serve the mobile industry, provided carriers with something akin to an all-in-one music platform. On behalf of mobile operator customers, firms like Musiwave (which developed Vodafone's platform), Melodeo (which served Rogers in Canada), and Groove Mobile (which handled many parts of Sprint's mobile music services) aggregated and formatted content from music labels, designed and customized the software clients that handset makers preloaded on their devices, and provided back-end support to ensure smooth integration with existing mobile applications. White-label music services, meanwhile, provided infrastructure to other companies' PC-based online music stores. These services, such as MusicNet and Loudeye, built and sold front-to-back, turnkey online retail systems to which corporate customers then added their branded "skins." White-label services also offered customized digital music platform solutions to online retailers. Although they had limited experience in mobile delivery and applications, these services had begun to adapt their PC-based experience to a mobile environment.

Niche players in both categories appropriated 10% to 15% of the download retail price for content aggregation, and also charged fixed software licensing and maintenance fees.<sup>49</sup> Over time, however, both groups of vendors had become increasingly squeezed by powerful players above them (mobile operators and online retailers) and below them (record labels) in the value chain.

### *Online Music Retailers*

Apple's iTunes claimed an overwhelmingly large share of the digital music retailing market, with five other players accounting for most of the remaining 20% to 30% of that market. Those players included music stores affiliated with the Internet portals AOL, MSN, and Yahoo!, as well as two standalone music stores, Napster and Rhapsody. In addition, Amazon.com had entered the market in

2006, and speculation was rife that Google would enter as well. On the one hand, the mobile music market might circumvent these players altogether. On the other hand, they had the potential to serve as vital partners to mobile operators that sought to offer a seamless experience between PCs and mobile phones.

### *Handset Makers*

Major handset OEMs (original equipment manufacturers) like Motorola, Nokia, and Samsung were racing to build robust yet inexpensive music devices to compete with the iPod. (Handsets with customized specifications required about a year for delivery.) Such devices presented OEMs with an opportunity to differentiate themselves in an industry that some analysts believed was becoming commoditized. Despite the iPod's dominant presence in North America, handset OEMs planned to leverage their experience in Asia and Europe to gain traction in the U.S. mobile music market. (See **Exhibit 13—Music-Enabled Handset Availability and Pricing, 2006.**)

**Motorola** The leading player in North America, Motorola had teamed with Apple to develop the ROKR. Despite that product's failure, Motorola introduced a follow-up device, the SLVR, in March 2006. Like the ROKR, the SLVR held just 100 songs, but it offered several features lacking in the ROKR and also came with a lower price tag (\$200).<sup>50</sup> It also supported content from sources other than iTunes. Motorola's next music phone, the ROKR E2, would reportedly support not only multiple music formats, but also Motorola's new iRadio service. For a \$7 monthly subscription fee, carriers would resell iRadio to users, who would gain access to 435 content channels.

**Nokia** The worldwide mobile handset share leader, Nokia launched the N91 in the United States in June 2006. The N91, designed to crack the mobile music market, was the first music phone with an integrated hard drive; it contained enough memory (4 gigabytes) to store roughly 1,000 songs. The device also featured a color LCD screen, an MP3 player, and an FM radio.

**Samsung** Along with being third in handset market share, both worldwide and in the United States, Samsung was one of the world's leading portable MP3 player manufacturers. Its success in the handset market stemmed from a strategy of flooding that market with numerous low-cost, mid-price models (in 2005, Samsung released a new handset model in North America every two weeks), and it planned to follow a similar course with an aggressive MP3 player campaign in 2006.<sup>51</sup> Peter Weedfald, senior vice president of consumer electronics for Samsung's North American division, bluntly declared:

What's the difference between how they (Apple) have gone to market and how we have gone to market? It's really simple. They spent \$165 million last year to advertise iPod products. We spent \$1 million. We are going to break the code. In 2006, we are going to over-invest in advertising and marketing around these really hot, new digital video and digital audio products, and we will spend tens of millions of dollars.<sup>52</sup>

Already, Samsung was a major provider of music-enabled mobile phones within the U.S. market, supplying key handsets for the music services of Sprint and Verizon Wireless.

### *Mobile Operators*

Intense competition and high market share concentration among the "Big Four" carriers—Cingular (with a 32% share), Verizon Wireless (25%), Sprint-Nextel (15%), and T-Mobile (7%)—characterized the U.S. wireless market. These operators hoped that music services would attract new

subscribers, boost revenue from existing subscribers, and strengthen customer loyalty. By 2006, wireless carriers had launched various music services. Early results indicated slow adoption rates, which observers attributed to limited handset availability and lagging transition to networks that would support faster download speeds. All the same, observers also highlighted inherent advantages that carriers arguably possessed in delivering music. These potential advantages included purchasing convenience, device singularity, margin opportunities, and scalability.

**Purchasing convenience** Mobile connectivity and OTA delivery offered consumers instant gratification—the ability to download music anytime, anywhere. Mobile operators argued that this benefit alone should command a price premium over online retailer offerings, although research differed on how much consumers actually valued this benefit.<sup>53</sup>

**Device singularity** Mobile music advocates made the intuitive assumption that, all else being equal, consumers preferred to carry one device rather than two. By way of example, they pointed to the now-ubiquitous camera functionality on handsets, which had begun to cannibalize digital camera sales, according to some indicators. In Japan, for example, 12.5% of consumers used their camera phone as their primary camera.<sup>54</sup>

**Margin opportunities** Because of their established billing infrastructure and subscriber relationships, mobile operators could avoid the credit card fees—of about 15 cents per transaction—that plagued a la carte services.<sup>55</sup> That capacity translated into a significant margin increase on a 99-cent sale (although online retailers were beginning to negate this advantage by moving to batch processing of payments).

**Scalability** By one estimate, users would buy nearly 1 billion mobile phones worldwide in 2006.<sup>56</sup> Given that vast installed base, their existing distribution infrastructure, and ongoing handset replacement patterns, mobile operators projected a vast potential market for music-enabled handsets and services.

## Competitive Landscape: Key Player Strategies

### *Apple*

Apple's dominant hold on the digital music market remained intact in 2006. (See Exhibit 14—Selected Financial Data, 2001–2005.) Its iTunes-iPod business model was both simple and powerful. Users could purchase and download any track from the iTunes music store for 99 cents—a price that had become a de facto industry standard—or a full album for \$9.99. No subscription or streaming service option was available. With free downloadable iTunes software, users could also store and sort music on either a PC or a Macintosh. They could use a USB cable to sync iTunes content seamlessly between a computer and an iPod. But if they wanted to play iTunes music on a portable device, the iPod was essentially their only alternative. For iTunes, Apple used a closed proprietary platform that combined the ACC file format with FairPlay DRM. Music purchased from iTunes could only be played on the iPod and the iPod only supported music purchased from iTunes or music converted from rival formats into AAC.

While Apple barely broke even on the sale of iTunes music, it enjoyed an average margin of 25% on iPod sales.<sup>57</sup> The company had steadily released devices in the iPod line that covered a range of size, storage, functionality, and price needs. Lauded for its sleek design and simple, easy-to-use user interface, the iPod remained the dominant portable music player in 2006. The iPod's extraordinary

popularity fueled a market for complementary accessories. This market (covering iPod-compatible speakers, docking stations, protective cases, car-based FM transmitters, noiseless headphones, and other peripherals) had grown from \$850 million in 2005 to a projected \$1.4 billion in 2006.<sup>58</sup>

To counter the potential threat posed by mobile operators, Apple in 2005 launched the ROKR in partnership with Cingular and Motorola. According to one report, several carriers—loath to allow Apple a foothold in their market—had rebuffed partnership offers from Apple and Motorola.<sup>59</sup> After the ROKR's flop, rumors swirled about Apple's follow-on response to the mobile music threat. Some observers suggested that Apple would need to launch its own virtual mobile service to fend off the threat from mobile operators. Another possible strategy for Apple would be to design, manufacture, and market its own iTunes-compatible mobile phone. By going that route, some industry experts argued, Apple could preempt competitive threats from mobile operators and handset OEMs. "The iPod with phone functionality is going to be a category killer," said Kirk Yang, managing director of Citigroup's Asia Pacific operations.<sup>60</sup>

### *Microsoft*

Microsoft made its presence felt in the digital music market on multiple fronts. (See Exhibit 14—Selected Financial Data, 2001–2005.) In late 2004, the company launched its MSN Music store, which offered full track downloads for 99 cents. In late 2005, Microsoft announced that it was teaming up with MTV to launch a new subscription-based digital music service, known as Urge.<sup>61</sup> And in July 2006, the company acknowledged that it was developing a line of products under the brand name Zune, which would include both an iTunes-like music service and a handheld music player that would compete directly with the iPod. The first version of the player, to be released later that year, would feature wireless capacity. Further details, such as how Zune would relate to other Microsoft digital music offerings, remained subject to speculation.<sup>62</sup> Meanwhile, Microsoft had launched the "Plays for Sure" campaign, which aimed to develop a common digital music platform around the company's WMA codec and DRM. "They want to show that the Apple universe is a little one, and Microsoft is a big one," noted one digital media executive.<sup>63</sup> Analysts noted that this "Intel Inside"-like branding effort capitalized on the relative ubiquity of Windows Media Player. To qualify for the Plays for Sure logo, device manufacturers had to demonstrate that their products were compatible both with WMA and with other Plays for Sure products. As of 2006, more than 70 devices—including devices from leading manufacturers such as Creative Labs, Dell, Gateway, iRiver, and Samsung—had gained membership in the Plays for Sure ecosystem. In this environment, many online music stores (such as AOL MusicNow, Napster, Rhapsody, and Wal-Mart) had adopted WMA as their platform. Microsoft's latest version of Windows Media (Version 10) also supported subscription models, which some observers believed would eventually become the dominant model for mobile music.

Microsoft's position in the mobile operating system (OS) market gave it another advantage in targeting mobile music. With its Windows Mobile OS platform, Microsoft was gaining ground on smartphone platform rivals PalmSource and Symbian. Moreover, it had already launched a version of Windows Media Player for Windows Mobile OS. Many handset OEMs were traditionally reluctant to use the Windows Mobile platform on their devices, fearing that Microsoft would come to dominate the mobile OS market just as it had the PC OS market. Microsoft responded by offering attractive terms for Windows Mobile OS to mobile operators directly. According to one insider, Microsoft also offered favorable terms to carriers for leasing its WMA codec and DRM. Still, wariness of Microsoft—which the Zune initiative would perhaps intensify—prevailed among many players in the mobile music business. One executive, the CEO of platform vendor for two international carriers, echoed this sentiment: "Because of the potential market power associated with widespread adoption of WMA,

there could be entrenched resistance among carriers and handset manufacturers to not allow that camel's nose too far under the tent."<sup>64</sup>

### *Mobile Network Operators*

Among all players in the mobile music market, those most obviously primed to take advantage of its opportunities were the three largest wireless carriers: Cingular, Sprint-Nextel, and Verizon Wireless. Mobile virtual network operators (MVNOs) also had a key presence in the market.

**Cingular** As the largest mobile operator in terms of subscriber market share, Cingular saw in digital music a valuable opportunity to increase the slumping ARPU of its existing subscriber base, to attract new subscribers, and to reduce subscriber churn. (See **Exhibit 14**—Selected Financial Data, 2001–2005.) Despite the failure of the ROKR, Cingular recognized the value of partnering with, Apple the dominant player in digital music. In 2006, the company began supporting the SLVR, another device designed for use with iTunes and manufactured by Motorola. At the same time, Cingular sought to avoid getting locked into the iTunes standard. In 2006, it began supporting Microsoft's WMA format in its mMode Music Store, a service that allowed users to purchase and download songs via PC for 99 cents. Customers could transfer songs to their phone or any other Plays for Sure device through wired syncing.

On the service side, Cingular in November 2005 launched MobiRadio, a subscription-based streaming music service that let users stream channel-based music on their mobile phone. For \$9.99 per month, users could stream a limited amount of data; an unlimited data plan was available for \$19.99 per month. Since music streaming required high levels of data transmission, subscribers to the less expensive plan were apt to accrue extra data charges. High expense was one barrier to MobiRadio adoption. Another was that only two handsets offered by Cingular (Nokia made both of them) were compatible with the service.<sup>65</sup>

**Sprint-Nextel** The product of a 2005 merger between Sprint and Nextel, Sprint-Nextel (hereafter called Sprint) was the third-largest U.S. wireless carrier. (See **Exhibit 14**—Selected Financial Data, 2001–2005.) Sprint, hoping to leverage its recently deployed 3G network, took a multi-pronged approach to its digital music market entry. In September 2005, the company announced a partnership with RealNetworks' Rhapsody Radio to roll out a streaming audio, video, and podcast service priced at \$6.95 per month. Meanwhile, Sprint hedged that bet by striking an alliance with Sirius Satellite Radio to offer a channel-based music service for \$7 per month.<sup>66</sup> (Analysts viewed Cingular's MobiRadio as a response to Sprint's Sirius offering.<sup>67</sup>)

Finally, in October 2005, Sprint became the first U.S. carrier to open an Internet-based music store that also offered OTA downloading. For \$2.50, users received two copies of a song: one delivered directly to a phone and one that users could retrieve from the Sprint Music Store for use in their PC. Although this service (part of Sprint's Power Vision suite) had logged 1 million downloads in its first few months of operation, critics pointed out free promotional downloads accounted for much of that number.<sup>68</sup> Sprint also faced criticism for its high pricing and lack of compatibility with non-Sprint devices.<sup>69</sup> Along with the \$2.50 download price, users paid subscription fees of \$15 to \$25 per month to access the music store and other multimedia features. Sprint spokesman Mark Elliott justified that pricing structure by saying, "The ability to download a song without plugging into your computer is a great benefit and there's a premium to pay for that."<sup>70</sup> (Yet the author of a willingness-to-pay study offered a conclusion that argued strongly against that view: "Consumers will reject music services that charge more than \$1.25 per music download to multiple devices."<sup>71</sup>) To support its music services, Sprint offered three compatible phones; made by either Samsung or Sanyo, they that cost from \$150 to \$200 apiece.<sup>72</sup>

**Verizon Wireless** A joint venture between Verizon Communications and Vodafone, the leading global mobile operator, Verizon Wireless (VZW) was second in U.S. market share and had experienced the largest market share gains of any carrier in 2005.<sup>73</sup> With its fully deployed high-bandwidth 3G network, VZW appeared well positioned to exploit the mobile music opportunity. (See Exhibit 14—Selected Financial Data, 2001–2005.)

In January 2006, several months later than its mobile operator competitors, VZW launched a music download service as part of its V-Cast platform, which enabled subscribers to download or stream a variety of entertainment content. The V-Cast Music service allowed users to download full tracks from the V-Cast Music Store to their PC for 99 cents or via OTA downloading for \$1.99. In the latter case, VZW offered a dual-delivery product similar to that of Sprint, with one copy of a song going to a PC and a second copy going OTA to a mobile phone. On top of charges for individual song downloads, VZW charged a monthly \$15 subscription fee that covered unlimited data transmission.<sup>74</sup> The V-Cast Music Service relied on Microsoft's Windows Media technology and could play songs purchased from other sources, such as Napster, so long as they were in WMA or MP3 format. Likewise, songs purchased from the PC-based V-Cast Music Store were in WMA format. Although the service was subject to some of the same criticism for high pricing as its competitors, early reviews generally rated it as the best on the market.<sup>75</sup>

**Mobile Virtual Network Operators** MVNOs used the networks of major mobile operators through leasing arrangements; they paid the network operators according to the amount of data carried. Although they lacked the scale and financial resources of the large carriers, MVNOs were potentially significant players in mobile music by virtue of their emphasis on data services, their young subscriber bases, and their innovative niche-based business models. Despite their smaller scale, however, MNVOs required significant investment: One MVNO, amp'd Mobile, had reportedly received about \$250 million in start-up funding over several years.<sup>76</sup>

Virgin Mobile USA (VMU), the pioneer U.S.-based MVNO, was jointly owned by the U.K.-based Virgin Group and Sprint. VMU targeted young subscribers (those aged 16 to 24) with prepaid plans and targeted content. The combination of VMU's young subscriber base and Virgin Group's heritage as a music label led many industry experts to feel that music services were a natural next step. Already, VMU had been extremely successful in selling ringtones, capturing 7% of that market despite its overall subscriber market share of 2%.<sup>77</sup> However, VMU had not yet migrated to a 3G network, nor had it announced a mobile music strategy.

Two other MVNOs had potential as mobile music players. Boost Mobile, like VMU, focused on the youth segment and leased capacity on Sprint's network. (Sprint held a major equity share in the company.) Boost Mobile positioned itself as an entertainment-focused carrier, although as yet its music-related offerings consisted only of ringtone sales, Song ID (a technology that could identify music heard and transmitted through a mobile phone), and a service that let customers use a phone to buy CDs from Amazon.com.<sup>78</sup> Finally, Helio was a joint venture between EarthLink, a major U.S. Internet service provider, and SK Telecom, a leading Korean mobile operator and a worldwide pioneer in mobile music. Although Helio had not yet officially launched a commercial service, it had already publicized a strategy that involved leveraging 3G network capacity and partnering with MySpace, a highly popular social networking site with a strong presence in the music market.<sup>79</sup>

## Google

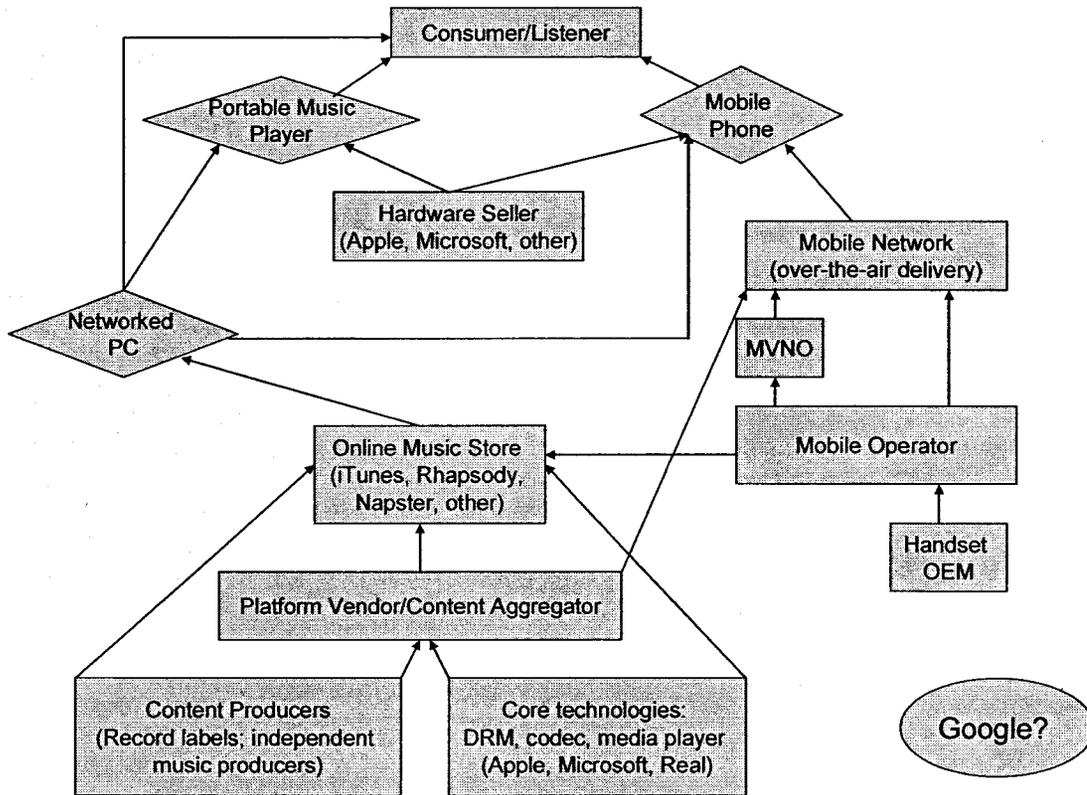
Although Google had no presence in the digital music market in mid-2006, speculation abounded that the company might make that market its next target. After capturing a dominant position in search technology in 2004, Google had aggressively expanded into adjacent businesses. One

speculation was that Google might attempt to fund "free" music through advertising.<sup>80</sup> (In May 2006, Napster announced that it would begin offering free, advertising-supported music streaming on a limited basis.<sup>81</sup>) A possible model for Google was its video distribution business. Widely panned at the outset, that business had come to generate increasing consumer interest over time. With its track record of taking bold, calculated risks, Google loomed as a company that could greatly affect the competitive landscape of digital music.

### **The Future of Mobile Music**

Despite the enthusiasm of American wireless carriers for the near-term potential of mobile music, questions abounded regarding the future of that market. Through mid-2006, Apple's iPod remained the juggernaut of the digital music industry. Leaders at the wireless carriers wondered whether they needed to break Apple's stranglehold, or whether they could develop mobile music as a different category altogether. And even if they could develop mobile music as a new, complementary segment, what strategy should they pursue within it? At the same time, Steve Jobs had to wonder whether Apple needed to develop a wireless phone offering to maintain its digital music dominance, or whether it should focus on driving innovation within the existing digital music category. Moreover, if Apple did develop an iPhone (alone or in partnership with one or more carriers), would it be able to sustain its margins, or would it cannibalize its core business? Or, even worse, would carriers capture most of the value in any iPhone offering? Finally, Microsoft, Yahoo!, RealNetworks, Napster, Google, and a host of other players wanted a piece of the mobile music pie. Could many players participate profitably in this market, or would mobile music amount to another failed experiment in convergence, leaving behind a sea of red ink?

Exhibit 1 Digital Music Ecosystem



Source: Casewriters' formulation.

## Exhibit 2 U.S. Mobile Operators: Average Revenue Per User (ARPU), 2005

	Cingular	Sprint-Nextel	T-Mobile	Verizon Wireless	Total
Voice ARPU (per month)	\$45.42	\$53.30	\$46.41	\$45.51	\$47.63
Change from 2004	-4.1%	-9.7%	-6.3%	-4.9%	-5.8%
Data ARPU (per month)	\$4.22	\$4.57	\$4.40	\$3.92	\$4.22
Change from 2004	81.8%	39.1%	53.3%	71.0%	58.4%
Total ARPU (per month)	\$49.64	\$57.87	\$50.81	\$49.43	\$51.85
Change from 2004	-0.1%	-7.1%	-3.1%	-1.5%	-2.6%

Source: Adapted from Phil Cusik, et al., "1Q06 Wireless Preview: Solid Start to 2006; Up ARPU Year?" Bear Stearns Equity Research, April 17, 2006, p. 4.

## Exhibit 3 U.S. Retail Digital Music Market (in Millions of Dollars), 2004-2010E

	2004	2005	2006E	2007E	2008E	2009E	2010E
PC digital downloads	190.7	510.0	738.3	886.0	968.1	1,007.6	1,032.1
PC-based subscriptions	61.0	141.6	201.2	245.9	289.9	331.1	368.6
Satellite radio	21.8	55.3	105.0	165.4	226.9	292.9	362.9
Ringtones <sup>a</sup>	250.0	242.0	169.4	118.6	83.0	58.1	40.7
Mastertones and mobile downloads <sup>b</sup>	0.0	272.7	477.3	644.3	802.2	949.7	1,052.6
<b>Total retail digital music revenue</b>	<b>523.5</b>	<b>1,221.6</b>	<b>1,691.2</b>	<b>2,060.2</b>	<b>2,370.1</b>	<b>2,639.4</b>	<b>2,856.9</b>

Source: Compiled from Richard Bilotti and Svetlana Ksenofontova, "Warner Music Group: Lowered Digital Forecasts Don't Justify a Premium: Going to Underweight-V," Morgan Stanley Equity Research, January 27, 2006, pp.28, 31, 33-34.

<sup>a</sup> Includes mono and polyphonic ringtones.

<sup>b</sup> Includes master ringtones and full-track mobile downloads.

**Exhibit 4** Digital Music Device Shipments (in Millions), 2004–2010E

	2004	2005	2006E	2007E	2008E	2009E	2010E
<b>Apple iPod Devices</b>							
United States	3.7	27.1	34.3	41.1	45.2	49.8	54.7
Rest of the World	0.8	4.8	11.4	21.8	26.4	28.5	29.8
Total	4.5	31.9	45.7	62.9	71.6	78.3	84.5
<b>Other Digital Music Devices</b>							
United States	20.6	26.4	35.9	38.0	43.2	47.2	51.0
Rest of the World	13.7	17.6	23.9	25.3	28.8	31.5	34.0
Total	34.3	44.0	59.8	63.3	72.0	78.7	85.0
<b>Total Digital Music Devices</b>	<b>38.8</b>	<b>75.9</b>	<b>105.5</b>	<b>126.2</b>	<b>143.6</b>	<b>157.0</b>	<b>169.5</b>

Source: Adapted from Richard Bilotti and Svetlana Ksenofontova, "Warner Music Group: Lowered Digital Forecasts Don't Justify a Premium: Going to Underweight-V," Morgan Stanley Equity Research, January 27, 2006, p. 29.

**Exhibit 5** Global Handset Shipments (in Thousands), 2003–2009E

	2003	2004	2005	2006E	2007E	2008E	2009E
North America	108,074	134,620	144,940	171,377	193,075	204,523	212,727
YoY Growth	13.3%	24.6%	7.7%	18.2%	12.7%	5.9%	4.0%
Worldwide	521,024	678,534	794,269	955,674	1,187,922	1,354,739	1,444,504
YoY Growth	21.9%	30.2%	17.1%	20.3%	24.3%	14.0%	6.6%

Source: Adapted from Pablo Perez-Fernandez, Mike Burton, and Jonathan Hoopes, "2006–2009 Handset Estimates: A Bright Future," Think Equity Partners LLC, January 9, 2006, p. 24.

**Exhibit 6** PC-Based Digital Music Market: Downloads by Country (in Millions), 2004–2010E

	2004	2005	2006E	2007E	2008E	2009E	2010E
United Kingdom	5.7	26.4	66.6	96.4	115.8	126.5	131.7
France	1.5	8.0	26.0	37.6	45.2	49.4	51.4
Germany	6.2	21.0	510.6	82.1	98.6	107.8	112.2
United States	142.6	352.7	510.6	612.7	669.5	696.7	713.7
Japan		12.0	28.9	45.9	63.1	91.4	109.7
Rest of the world		1.5	6.4	6.3	6.2	6.2	6.1
<b>Total</b>	<b>156.0</b>	<b>421.6</b>	<b>695.1</b>	<b>881.1</b>	<b>998.4</b>	<b>1,078.0</b>	<b>1,124.8</b>

Source: Adapted from Richard Bilotti and Svetlana Ksenofontova, "Warner Music Group: Lowered Digital Forecasts Don't Justify a Premium: Going to Underweight-V," Morgan Stanley Equity Research, January 27, 2006, p. 27.

**Exhibit 7** Comparison of Leading Digital Rights Management (DRM) Systems

Platform	Apple iTunes	Microsoft Windows Media (WMA)	Open Mobile Alliance (OMA)	RealPlayer
Mobile DRM solution	FairPlay	WMA DRMA (V10)	OMA 2.0	Helix/Harmony
Proprietary?	Yes	Yes	No	Yes
Available for license?	No	Yes	Yes	Yes
Supports subscription?	No	Yes	Yes	Yes
Challenges	Compatible only with iTunes	Processor intensive; hard to use with small devices	Revenue share negotiations have been deadlocked since 2004, providing WMA with de facto monopoly as subscription standard	Seen as less viable than other systems; quickly becoming irrelevant

Source: Adapted from company websites, with assistance from industry expert (interviewed, July 15, 2005).

**Exhibit 8** Codec Comparison and Codec-DRM Pairings

Codec	Description	Services/Users	DRM Pairing
MP3	Most popular audio codec. Generally encoded at 128 kbps for "good" quality. Lacks DRM; most illegal downloads are in MP3 format	Many download sites, including AllofMP3.com, Kazaa, and others	None
AAC	Apple's iTunes, by default, endorses AAC at 128 kbps as "high" quality. No built-in DRM.	iTunes	FairPlay, other proprietary DRM
aacPlus	High-quality sound can be realized at bit rates as low as 32 kbps. Currently used in some QUALCOMM chipsets	iTunes, Loudeye, and Melodeo white-label solutions	FairPlay, other proprietary DRM
aacPlus (v2)	Considered optimal for mobile. High-quality sound can be achieved at encoding rates as low as 24 kbps.	Melodeo white-label solution	FairPlay, other proprietary DRM
WMA	Comparable in fidelity to MP3, but smaller in file size. Latest version, WMDRM-10, enables subscription-based digital distribution	AOL MusicNet, Napster, VZW, Yahoo! Music, others	WMDRM-10
ATRAC3	Proprietary format created by Sony. Claimed to produce files smaller than MP3 and ACC at similar encoding rates. Only used in Sony players.	Sony Connect	Sony proprietary DRM

Source: Adapted from company websites, with assistance from industry expert (interviewed, July 15, 2005).

**Exhibit 9** Digital Music Subscription Services: Estimated Market Shares, 2005

	Subscribers (thousands)	Market Share	Monthly ARPU	Market Size (\$ millions)
RealNetworks Rhapsody Music	1,400	43.1%	\$12.50	\$210.0
Napster	500	15.4%	\$12.50	\$ 75.0
AOL MusicNet	450	13.8%	\$12.50	\$ 67.5
Yahoo! Music	700	21.5%	\$ 8.50	\$ 71.4
Other	00	6.2%	\$10.50	\$ 25.2
<b>Total</b>	<b>3,250</b>	<b>100.0%</b>	<b>\$11.00</b>	<b>\$449.1</b>

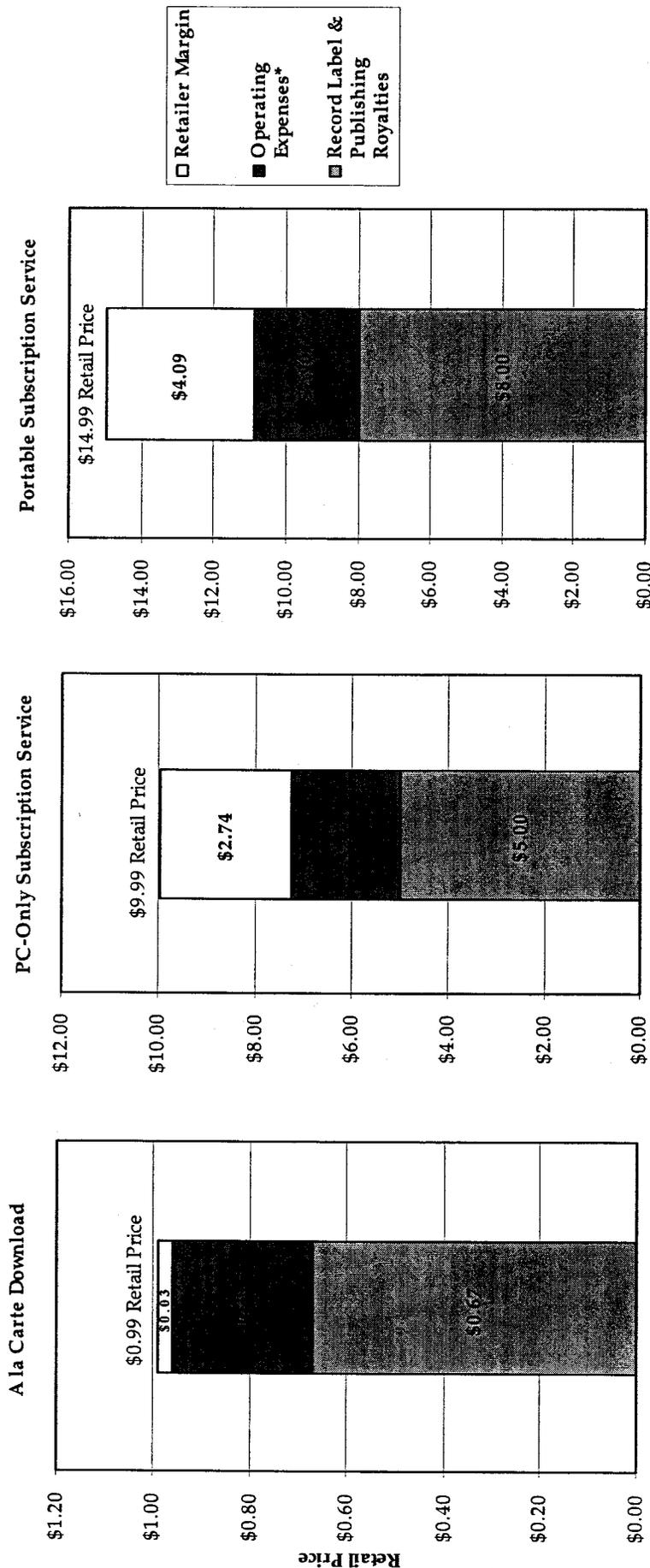
Source: Casewriter estimates, based on data in Darren Aftahi, "RealNetworks Company Report," ThinkEquity Partners LLC, April 13, 2006, p. 7; and Richard Bilotti and Svetlana Ksenofontova, "Warner Music Group: Lowered Digital Forecasts Don't Justify a Premium: Going to Underweight-V," Morgan Stanley Equity Research, January 27, 2006, p. 32.

## Exhibit 10 Major Digital Music Retailers: Service Offerings and Pricing Information

Retailer	Service	Details	Size of Music Library	Subscription Fee (Per Month)	Permanent Download Price	
					Track	Album
<b>Apple Computer</b>	iTunes	A la carte; try before you buy	3 million-plus tracks	NA	\$0.99	\$9.99
<b>RealNetworks</b>	RealPlayer 10 Music Store	A la carte	400,000-plus tracks	NA	\$0.99	NA
	Rhapsody 25	25 free track plays per month	2 million-plus tracks	Free (ad-based)	NA	NA
	Rhapsody Unlimited	Unlimited subscription: PC-only	2 million-plus tracks	\$9.99	\$0.89	\$8.99 (most titles)
	Rhapsody To Go	Unlimited subscription: PC, portable	2 million-plus tracks	\$14.99	\$0.89	\$8.99 (most titles)
<b>Napster</b>	Napster	Unlimited subscription: PC-only	2 million-plus tracks	\$9.95	\$0.80 (vol. disc.)	NA
	Napster To Go	Unlimited subscription: PC, portable	2 million-plus tracks	\$14.95	\$0.80 (vol. disc.)	NA
	Napster Free	A la carte; try before you buy	2 million-plus tracks	NA	\$0.99	NA
<b>Yahoo!</b>	YahooMusic Unlimited	Unlimited subscription: PC-only	1 million-plus tracks	\$6.99 or \$59.88/year	\$0.79	\$9.99
	YahooMusic Unlimited To Go	Unlimited subscription: PC, portable	1 million-plus tracks	\$11.99 or \$119.88/year	\$0.79	\$9.99
	YahooMusic Engine	A la carte; try before you buy	1 million-plus tracks	NA	\$0.99	NA
<b>AOL</b>	Music Now Subscriber	Unlimited subscription: PC-only	2 million-plus tracks	\$9.95	\$0.99	NA
	Music Now Subscriber/Portability	Unlimited subscription: PC, portable	2 million-plus tracks	\$14.95	\$0.99	NA
	Music Now Shopper	A la carte; try before you buy	2 million-plus tracks	NA	\$0.99	NA
<b>Microsoft (MSN)</b>	MSN Music	A la carte; try before you buy	1 million-plus tracks	NA	\$0.99	\$9.99 (most titles)
	MSN Radio Plus	Commercial-free Internet radio	50-plus stations	\$4.99 or \$29.99/year	NA	NA

Source: Retailer websites (surveyed July 2006); data adapted from Darren Aftahi, "RealNetworks Company Report," ThinkEquity Partners LLC, April 13, 2006, p. 18.

Exhibit 11 Digital Music Economics by Service Model



Source: Casewriter estimates and adapted from Darren Afzahi, "RealNetworks Company Report," ThinkEquity Partners LLC, April 13, 2006, p. 18; and Imran Khan, "Online Music: Yahoo! Music Offers Longer-term Opportunity," JP Morgan Equity Research, June 13, 2005, p. 4.

\*Operating expenses include aggregation fees, credit card transaction fees, and other variable costs.

## Exhibit 12 Theoretical Economic Models by Service Offering

Unlimited Channel-Based Streaming		Comments/Assumptions
Subscription fee (per month)	\$5.99	Based on Sprint/Sirius service
Third-party vendor revenue share	<u>\$2.99</u>	50% revenue share estimate with Sirius
Carrier gross margin	\$3.00	
Streaming data costs	<u>\$4.05</u>	4 min usage/day, \$0.15/MB data cost
Carrier net margin	<b>-\$1.05</b>	
Unlimited On-Demand Streaming		Comments/Assumptions
Subscription fee (per month)	\$15.00	PC-based portable subscriptions
Label/publishing revenue share	\$7.50	Estimated at 50% of retail price
Third-party aggregator/platform revenue share	<u>\$2.25</u>	Estimated at 15% of retail price
Carrier gross margin	\$5.25	
Streaming data costs	<u>\$12.96</u>	3 streams/day, \$0.15/MB data cost
Carrier net margin	<b>-\$7.71</b>	
Single Track Download OTA to Mobile		Comments/Assumptions
Retail price/download	\$1.50	
Label/publishing revenue share	\$0.98	Estimated at 65% of retail price
Third-party aggregator/platform revenue share	<u>\$0.22</u>	Estimated at 15% of retail price
Carrier gross margin	\$0.30	
Data transmission cost	<u>\$0.18</u>	1.2 MB, track file size, \$0.15/MB data cost
Carrier net margin	<b>\$0.12</b>	

Source: Casewriter estimates and calculations.

Notes: "OTA" refers to over-the-air data transmission. Each of these models assumes an encoding rate of 32 kbps and a network transmission rate of 120 kbps.

## Exhibit 13 Music-Enabled Handset Availability and Pricing, 2006

Carrier (Share)	Handset Maker	Handset Model	Retail Price	Compatibility
<b>Cingular (32%)</b>	Motorola	ROKR E1 <sup>a</sup>	\$250	iTunes
	Motorola	SLVR L7	\$200	iTunes, WMA, MP3
	Sony Ericsson	W600i	\$300	AAC, MP3
<b>Sprint-Nextel (15%)</b>	Samsung	MM-A920	\$150	Sprint Music Store
	Sanyo	MM-7500	\$150	Sprint Music Store
	Samsung	A900	\$200	Sprint Music Store
<b>Verizon Wireless (25%)</b>	LG	VX 8100	\$120	V-Cast Music, WMA
	Samsung	SCH-a950	\$200	V-Cast Music, WMA
	Audiovox	CDM 8945	\$130	V-Cast Music, WMA

Source: Company websites; efforts to initiate a standard two-year contract in Boston, Massachusetts, May 2006.

<sup>a</sup> Discontinued.

Exhibit 14 Significant Companies: Selected Financial Data (in Millions of Dollars), 2001–2005

	2001	2002	2003	2004	2005
<b>Apple Computer</b>					
Net revenue	5,363	5,742	6,207	8,279	13,391
Cost of revenue	4,026	4,021	4,387	5,870	9,738
Research and development	441	447	471	489	534
Operating income (EBITDA)	-231	164	139	499	1,800
Net income	-25	65	69	276	1,335
Employees	11,434	12,241	13,556	13,426	16,820
Return on equity	-0.9%	2.6%	1.6%	5.4%	17.9%
Sales growth	-32.8%	7.1%	8.1%	33.4%	68.3%
Net income growth	-103.2%	-360%	6.2%	300.0%	383.7%
Market value at year-end	7,703	5,146	7,747	28,893	60,587
<b>Microsoft Corp.</b>					
Net revenue	25,296	28,365	32,187	36,835	39,788
Cost of revenue	1,919	4,177	4,596	5,899	5,316
Research and development	4,379	4,307	4,659	7,779	6,184
Operating income (EBITDA)	13,256	13,584	15,313	12,376	17,526
Net income	7,346	7,829	9,993	8,168	12,254
Employees	47,600	50,500	55,000	57,000	61,000
Return on equity	16.3%	15.0%	16.4%	10.9%	25.5%
Sales growth	10.2%	12.1%	13.5%	14.4%	8.0%
Net income growth	-22.0%	6.6%	27.6%	-18.3%	50.0%
Market value at year-end	356,806	276,412	296,073	290,720	278,358
<b>Cingular Wireless</b>					
Net revenue	14,108	14,727	15,483	19,436	34,433
Cost of revenue	4,404	4,930	5,683	7,482	14,095
Research and development	NA	NA	NA	NA	NA
Operating income (EBITDA)	4,469	4,371	4,378	4,605	8,974
Net income	1,692	1,207	1,022	201	333
Employees	36,000	33,800	39,400	70,300	64,000
Return on equity	28.9%	16.4%	12.1%	0.5%	0.7%
Sales growth	NA	4.4%	5.1%	25.5%	77.2%
Net income growth	NA	-28.7%	-15.3%	-80.3%	65.7%
Market value at year-end	NA	NA	NA	NA	NA

## Exhibit 14 (continued)

	2001	2002	2003	2004	2005
<b>Sprint-Nextel</b>					
Net revenue	16,924	15,182	14,185	27,428	34,680
Cost of revenue	8,278	6,870	6,181	12,656	14,384
Research and development	NA	NA	NA	NA	47
Operating income (EBITDA)	4,262	4,518	4,478	8,134	10,939
Net income	-147	1,208	1,876	-1,012	1,785
Employees	NA	44,200	41,200	59,900	79,900
Return on equity	-1.2%	8.9%	2.3%	-7.5%	3.5%
Sales growth	-4.3%	-10.3%	-6.6%	93.4%	26.4%
Net income growth	-107.5%	-921.8%	55.3%	-153.9%	-276.4%
Market value at year-end	19,364	13,392	15,269	34,423	66,180
<b>Verizon Wireless</b>					
Net revenue	17,352	19,260	22,489	27,662	32,301
Cost of revenue	NA	5,526	6,550	7,810	9,482
Research and development	NA	NA	NA	NA	NA
Operating income (EBITDA)	NA	6,857	7,882	10,261	12,051
Net income	NA	2,584	3,083	4,698	6,152
Employees	NA	39,300	43,900	49,800	55,700
Return on equity	NA	12.7%	14.7%	21.0%	23.1%
Sales growth	22.0%	11.0%	17.0%	23.0%	17.0%
Net income growth	NA	NA	19%	52%	31%
Market value at year-end	NA	NA	NA	NA	NA

Sources: Standard & Poor's Compustat.

Notes: All information is on a fiscal-year basis, except for "market value at year-end," which is on a calendar-year basis. The fiscal year ends in September for Apple, in June for Microsoft, and December for the three wireless carriers.

NA = Not Available.

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