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XM Satellite Radio (A)

It wasn't until the numbers on his spreadsheet started to blur together that Robert Acker, director of strategic planning for XM Satellite Radio,¹ decided to call it a day. Although he enjoyed the strategy meetings, conference calls with industry experts, and the excitement that came with a start-up, developing the business plan for XM had been tough work, and for one night, he was tired of working on it.

The evening in late October 1997 was cool as Acker hopped in his car and headed home across the Potomac into Virginia from his office in northwest Washington, D.C. Instinctively, Acker turned on the radio and began to quickly flip through the stations. After finding commercials on the first three stations and an overplayed pop song on the fourth, Acker turned the radio off and smiled slightly. We're going to give radio a real shot in the arm, he thought.

Within several years, XM, a venture started by American Mobile Satellite Corporation (AMSC) that had recently partnered with WorldSpace Corporation, planned to deliver 50 or more high-quality, digital radio channels to the car and home via satellite, similar to the development of satellite television a few years earlier. Despite the growth of satellite television and cable TV before it, however, Acker knew that XM faced significant challenges in the coming months.

Although recent increases in satellite power coupled with advances in wireless, chipset, and audio coding technologies made it feasible to develop a system to deliver satellite radio directly to consumers anywhere in the continental U.S., no one had ever successfully provided nationwide radio coverage in this manner. In order to transform XM from a company existing only on paper to a major player in the radio industry, Acker and his colleagues from AMSC and WorldSpace knew that they needed to develop a complex satellite and terrestrial repeater network and launch it perfectly on Day One. Most worrisome to XM was that SIRIUS, the only other company in the United States to have been granted a license for satellite radio from the Federal Communications Commission (FCC), appeared to have a head start on XM both in terms of financing and technology.

Acker also realized that providing the necessary \$1 billion in up-front capital would require a leap of faith from potential investors. Attracting this much capital before the launch of the service was a

¹ XM Satellite Radio was previously named American Mobile Radio Corporation (AMRC) from 1992 to 1998. For simplicity, its current name is used. The current name of XM's principal competitor, SIRIUS, is also used instead of its former name, CD Radio.

Professors David B. Godes and Elie Ofek prepared this case with the assistance of Research Associate Peter Wickersham. HBS cases are developed solely as the basis for class discussion. Cases are not intended to serve as endorsements, sources of primary data, or illustrations of effective or ineffective management.

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major hurdle, and the jury was still out in Acker's mind as to how to put a realistic plan together that would provide a high enough return for this type of speculative investment. A radio service targeted at niche segments like truckers and classical music lovers might attract too small a customer base. On the other hand, a mass market service would have to be supported with mass market products and appropriate price points to be compelling enough to convince the average consumer to actually pay for radio. Reliable estimates of total market size, speed of adoption, and the selection of a revenue model (advertising-supported and/or subscription-based) would be critical for XM in upcoming discussions with investment banks, radio manufacturers, radio chipset makers, and satellite companies. SIRIUS had already announced that it would pursue a subscription-based model of about \$10 per month for 50 channels of commercial-free radio.² Since SIRIUS had already gone public and presented this model to Wall Street, XM felt significant pressure to consider a similar business model.

Acker turned into the driveway of his home knowing that these issues must be addressed as soon as possible.

Evolution of Radio and Broadcast Advertising³

*When the first radio station began in 1920, no one knew how to make money from broadcasting.*⁴

—Susan Smulyan

The question faced by XM as to who would pay for its radio service was not new. It was as old as the radio industry itself. In the 1920s, unprecedented demand from a public unaccustomed to instantaneously hearing about events and information from distant places, along with the desire of radio receiver manufacturers to sell products to the entire country, created the need for a national radio service similar to that of the railroad and telegraph. Consumer adoption of radio and the proliferation of broadcast stations clearly demonstrated this sentiment. As a result, the household penetration rate of radio quickly exceeded the rate for telephones. The number of operating broadcast stations in the United States grew from 30 in 1922 to 556 in 1923. The census of 1930 estimated that 12 million out of 30 million U.S. households (40%) owned at least one radio.⁵

Broadcasting content in the early 1920s began locally and was diverse with respect to geography, gender, and race. Radio was used both as a source of information and as a leisure tool. In rural areas, USDA market reports and forecasts from the weather bureaus were broadcasted in the early-morning hours and then segued to programs with content for homemakers such as recipe exchanges and health advice. By contrast, radio in urban areas represented the specific ethnic, religious, and local interests of immigrant cultures, and foreign-language broadcasts were common in cities such as New York and Chicago. However, the benefits of diverse programming were counterbalanced by a lack of production quality. Local broadcast stations were often financed by newspapers that had limited budgets and, thus, struggled to fill airtime with original programming, often broadcasting community events live to fill the gaps. With no clear purpose in broadcasting, most stations lost

² Dow Jones Online News, "Investing in Satellite-Radio Concern CD Radio Demands Patience," November 6, 1997.

³ Much of the information contained in this section is based on the following sources: Susan Smulyan, *Selling Radio: The Commercialization of American Broadcasting, 1920–1934* (Washington DC: Smithsonian Institution Press, 1994); and Derek Vaillant, "Radio," *Encyclopedia of American and Intellectual History*, vol. III (New York: Scribner, 2001).

⁴ Smulyan, *Selling Radio*.

⁵ Donna Halper, "History of Radio," <www.old-time.com/halper>.

money. To radio manufacturers in these early days, broadcasting content was viewed as secondary to the sales of receivers and transmitters, a view that was soon to change.

The emergence of a wired network (using rented telephone lines from AT&T) as the technological standard to connect local stations into a national radio service added further capital requirements to the broadcasting industry. Unable to sustain themselves on the goodwill of the local community, many stations began in the 1920s to experiment with sponsored programs and direct advertising as a way to pay for radio, although not without much criticism and debate from many listeners, educators, and those who did not envision radio as a for-profit industry. Sponsored programs such as “The Palmolive Hour” as well as the “Eveready Hour” became popular broadcasts, and radio orchestras often adopted the name of their sponsors, including Goodrich and Vicks.

Radio manufacturers, notably the Radio Corporation of America (RCA), entered the broadcasting arena in order to ensure that broadcasts went over the air and to keep demand for their radios high. David Sarnoff, vice president of RCA, explained that “without a broadcast sending station, the broadcast receiver is just a refrigerator without any ice in it.”⁶ From 1924 to 1926, Sarnoff and representatives from the “Radio Group” (GE, RCA, Westinghouse) and the “Telephone Group” (AT&T and Western Electric) met in secrecy in order to establish a broadcasting presence without provoking antitrust regulators. In 1926, an agreement was reached to form the National Broadcast Corporation (NBC). Specifically, two networks were formed, NBC Red and NBC Blue. The Columbia Broadcasting System (CBS) joined the NBC networks in 1927. NBC Blue was later sold and became the American Broadcasting Company (ABC) in 1945.

The 1930s—radio’s “Golden Age”—was characterized by national programming from a relatively small number of production companies. Local affiliates paid the national networks for the right to carry programs and advertisers supported both the national networks and local broadcasting stations. In 1931, although newspapers reported a loss in advertising for the year, annual advertising revenues for the radio industry were estimated to be more than \$30 million. Despite continued backlash throughout the 1930s over advertising, the appeal of commercial radio continued to grow. The adoption of AM radios by U.S. households reached 60% by 1934 and 80% by 1938. Programs like “Amos ‘n’ Andy” and entertainers such as Orson Welles flourished alongside news, commentary, and music programs. President Franklin D. Roosevelt called radio a “servant of justice” and used the medium frequently to deliver “Fireside Chats” to the nation.⁷

Following World War II, television began replacing AM radio as the broadcast medium of choice for U.S. households. The FCC, the regulator of commercial radio since 1934, began allocating frequency bands for television stations in 1946. The number of U.S. households owning a TV set grew from 1 million in 1949 to 10 million by 1951. Many popular radio programs switched over to television, and radio listenership declined, particularly at night. However, sales of car radios continued to climb due to the proliferation of automobiles in the post-war period. Radio listening began to change from a primarily stay-at-home activity to one that was increasingly part of the car-driving experience.

Despite the emergence of television, radio was not without innovation in the 1950s. These innovations occurred locally, however, as opposed to the national scope of previous innovations. Regional radio personalities like Todd Storz and Gordon McLendon began to provide a “show-time” aspect to AM radio by holding contests and by playing a regular rotation of 30 to 40 popular songs.

⁶ David Sarnoff, “Why Super-Broadcasting Means Better Service: Broadcast Address over Station KGO, Oakland, California,” October 26, 1924, in *Addresses, Press Releases, and Articles by David Sarnoff*, vol. 3, David Sarnoff Library, Princeton, NJ.

⁷ Halper, <www.old-time.com/halper>.

Throughout the late 1950s and 1960s, DJs became increasingly popular and powerful figures in the music industry. As one industry observer noted, “DJs were stars. They could play a song and 10,000 kids would instantly go out and buy it.” Total advertising revenue reached an all-time high of \$709 million in 1962.⁸ To support this growth, AM radio stations were often running between 18 and 20 commercial minutes every hour.

The late 1960s and early 1970s brought further change to the radio industry with the emergence of FM as a viable commercial radio alternative.⁹ This period saw the arrival of a new generation of rock artists such as Jimi Hendrix, the Doors and the Yardbirds. Moreover, these artists were increasingly making use of the latest high-fidelity recording technologies. FM radio stations, better suited than AM to deliver quality sound, capitalized on these developments by playing “album cuts”—i.e., unknown songs from well-known artists—instead of a standard playlist. Lee Abrams, a notable industry consultant of the time, who later joined XM in 1998, discussed the transition away from AM to FM radio: “AM radio appeared out of touch and unable to accept the new trends in music. AM looked and sounded out of date. FM threw away the AM rule book. It was a new approach and a new attitude.”

FM radio stations typically played fewer ads during this period: approximately six minutes per hour. The growth of FM stations continued to be significant in the 1980s and 1990s, increasing from 3,250 in 1980 to 5,600 in 1997, while AM stations grew in number from 4,400 to 4,800 in the same time period. **Exhibit 1** shows the trend in AM and FM share of listenership over several years. Many baby boomers recalled the 1960s and early 1970s as a special period in the history of radio. In some sense, many of them felt, this was the “Golden Age” of FM radio. During this period, FM radio was innovative, often irreverent, and its relative dearth of advertising gave it a non-commercial or non-corporate feel.

This changed gradually through the 1980s and 1990s as FM radio became a big, and profitable, business. The Telecommunications Act of 1996 removed national ownership limits and increased the number of stations any one operator could own in a local market. A summary of the FCC limitations on the number of stations owned by a single operator is presented in **Exhibit 2**. This legislation was soon followed by a wave of industry consolidation, as evident by the \$2.1 billion purchase of SFX Broadcasting by Capstar, the \$1.6 billion purchase of American Radio Systems by Westinghouse Media, and Jacor’s \$620 million purchase of 19 stations. As a result of the mergers and acquisitions, fewer radio stations were locally owned and operated. In 1997, industry experts expected this trend to continue. Leading radio group owners in September 1997 are shown in **Exhibit 3**.

Consolidation, and the consequent increase in debt, appeared to be forcing major radio groups to focus on increasing revenues through more advertising and on lowering overall group operating costs by standardizing programming formats and playlists. Some stations had found the purchase of programs produced for national appeal to be an effective way to deliver the ratings needed to sell advertising and/or to achieve cost savings. This programming, which was produced by a third party, was often referred to as “syndicated” programming. There were a number of companies in 1997 (Westwood One, for example) that produced and distributed syndicated programs to stations throughout the country. Many stations, even in the largest radio markets in the U.S., purchased

⁸ Paul Gumbinner, “From adversity, a stronger voice,” in *Advertising today, yesterday, tomorrow* (New York: Printers’ Ink Publishing Corp., 1963), p. 275.

⁹ FM (“Frequency Modulation”) differed from AM (“Amplitude Modulation”) in that AM varied the height (amplitude) of carrier sound waves while FM modulated the distance between the waves (frequency). Varying the frequency of the waves resulted in a better sound for radio listeners. AM was capable of carrying waves to greater distances than FM, but was more prone to interference and static.

morning “drive-time” programming that featured major celebrities like Howard Stern or Don Imus. It was less common for these big-market stations to purchase programming for other times of day. This was for two principal reasons. First, programming during the rest of the day tended to be more music-focused than talk- or entertainment-focused. Second, and related, the on-air personalities that delivered more music-oriented programming were less costly than morning-drive talent. As a result, syndicated day- and night-time programming was more common in smaller markets than in major metropolitan markets like New York, Chicago, and Los Angeles.

It was in such an environment that XM sought to offer consumers a fresh, new radio service.

XM Origins

XM Satellite Radio was founded in 1992 as a subsidiary of American Mobile Satellite Corporation. The vision of XM was to provide audio entertainment through the use of a satellite-based digital radio broadcast system capable of delivering 50 or more channels of audio directly to consumers throughout the continental United States. Like their satellite TV industry predecessors, a significant challenge for XM in creating this business was obtaining the required FCC license and an accompanying dedicated radio frequency band for the new service.

After five years of persistent lobbying by XM and other interested entrants, the FCC announced in March 1997 that it would set aside a portion of the radio spectrum for two companies to provide a Satellite Digital Audio Radio Service (SDARS). In establishing the program, the FCC stated that satellite radio would provide a greater variety of programming to the public.¹⁰ An auction was scheduled for April 1997 to accept bids for one of the two available licenses. XM entered the auction with three other companies—SIRIUS, Digital Satellite Broadcasting Corp, and Primosphere LP. In the month before the auction, XM also announced a 20% minority interest by WorldSpace, Inc., a private company developing satellite radio on a worldwide basis. WorldSpace provided much-needed technical expertise in the design and deployment of the service. However, without an FCC license, the business would be stopped in its tracks.

The auction conducted by the FCC lasted a total of 26 rounds. SIRIUS and XM submitted winning bids of \$83.3 million and \$89.9 million, respectively. Under the rules of the auction, SIRIUS and XM obtained identical licenses from the FCC and were obligated to begin building a satellite within one year of the license grant. In addition, each company was obligated to launch at least one operating satellite within four years and to have a fully operational system within six years. In October 1997, XM received final authorization to launch and operate a satellite system in order to provide satellite radio in the 2332.5–2345 MHz frequency band. SIRIUS also received authorization for the remaining 12.5 MHz allocated exclusively to the two satellite radio licenses. By this time, the race between XM and SIRIUS to develop satellite radio was already well underway.

XM System Architecture

The XM satellite radio system (see **Exhibit 4**) was designed to use a distribution network consisting of an uplink facility, two satellites, and, where necessary in urban areas, terrestrial repeaters to provide digital audio services to both fixed and mobile radio receivers throughout the continental U.S. XM hypothesized that the use of two high-power satellites, spatial diversity coupled

¹⁰ Ron Carter, “Skeptics Hear Static in Satellite Radio’s Future,” *The Columbus Dispatch*, March 31, 1997.

with error concealment in the signals from the satellites, and terrestrial repeater networks would provide national, near-ubiquitous radio coverage such that a listener could drive across several states without ever losing the signal. This was perceived to be a key advantage over traditional AM/FM radio where broadcast signals degraded significantly outside of a station's principal broadcast area.

Each component of the satellite radio system carried its own significance. The satellites were to be "parked" in geostationary orbits¹¹ aligned with the east and west coasts of the United States, and each would broadcast all channels of service to XM radios across the country with the exception of Alaska and Hawaii. Satellites using geostationary orbits had been used by the telecommunications industry since the late 1960s. The added expense to the system of using the latest high-power satellites was expected to keep the antennas required to receive the signal as small and unobtrusive as possible while also providing enough power to penetrate foliage and other potential obstructions.

The use of two satellites broadcasting identical signals added redundancy, or "spatial diversity," to the system. Thus, if the view to one satellite became obstructed, the radio would receive and play the signal from the other satellite without a loss in performance. Finally, a system of more than 800 terrestrial repeaters in more than 70 U.S. cities was expected to be an important component of the system in dense "urban canyons"—urban areas characterized by narrow, busy streets with very high buildings on both sides. The repeaters were designed to receive satellite signals and rebroadcast them at much higher power levels, allowing radio receivers to pick up signals that were reflected off buildings, cars, and other objects.

Listeners to XM's service would need small XM-band antennas on their cars or near a window when in a building. The specially designed and manufactured XM receiver would consist of an XM tuner and chipset. The tuner would isolate a clean XM signal from the satellite and terrestrial repeater signals reaching the antenna, further amplify it, and extract the digital signal from the XM-band waveform and send it on to the digital chipset. The chipset would then apply error correction, separate out individual channels, decrypt subscription-only channels, strip off and process accompanying data information like song titles and artist names, and convert the audio information back to analog. To listeners, selecting XM would be as simple as pressing a button to go from AM or FM to this new XM band, after which they would use all of their presets and other controls the same way as they did for AM and FM (see **Exhibit 5** for design prototypes). Receivers would be designed to be uniquely addressable, allowing XM to rapidly initiate or change services (e.g., premium services) to specific customers.

SIRIUS and "Terrestrial" Competitors

XM's lone competitor in the duopoly that was to become the satellite radio industry was SIRIUS, which by all accounts in 1997 was ahead in the race to market. Founded in 1990 and traded on the NASDAQ Small Cap Market since September 1994, SIRIUS was managed by two veterans of the telecommunications industry.¹² Unlike XM, SIRIUS had already received substantial investment of

¹¹ "Geostationary orbit" refers to a positioning system in which the satellite remains fixed with respect to a point on earth. As the earth rotates, the satellite rotates in exact synchronicity.

¹² W. Timothy Wallace, "CD Radio: radio's next frontier," Analyst report from Lehman Brothers, December 3, 1997.

approximately \$446 million through stock and bond offerings,¹³ and the company estimated that it would commence commercial operation of its service by the end of 1999.¹⁴

SIRIUS planned a fee-based service as opposed to an advertiser-supported service. Subscribers were to be charged about \$10 per month for 50 channels of near “CD quality” programming sound. Thirty of these channels were slated to be music stations, while the others would provide news, sports, and talk shows. All channels were expected to be commercial-free. The commercial-free feature was especially attractive because traditional “terrestrial” radio stations (AM and FM) still interrupted their broadcasts with as much as 20 minutes of commercials each hour.

In contrast to the relatively conservative press coverage of XM, there were numerous news stories about SIRIUS in 1997. Some of the press detailed SIRIUS’ expected launch strategy. In addition to the approximately 110 million commuters, one report stated, SIRIUS was expected to target truck drivers (3 million), owners of recreational vehicles (3 million), and the 45 million “underserved listeners” living in rural areas, which receive few FM radio stations.¹⁵ According to David Margolese, CEO of Sirius, “There are a few hundred million motorists in the United States. . . . There are truckers, RV owners and others who drive 30 or 40 miles each day that have to retune their radio to find a new station. With our service, you’ll be able to drive from New York to L.A. and always listen.”¹⁶

SIRIUS was also drawing the attention of Wall Street analysts, one of whom referred to the company as “one of the most compelling business opportunities” in the satellite telecommunications industry.¹⁷ Analyst estimates of SIRIUS’ adoption were approximately 1.2 million subscribers in year one growing to 7-7.5 million by the end of year five.¹⁸ In December 1997, several industry analysts rated SIRIUS as a “Buy.”

Although XM was still developing its business plan, its management had a good idea of SIRIUS’ planned product and programming mix in late 1997. Its product concept, publicly announced in 1997, featured the ability for satellite radio subscribers to receive SIRIUS broadcasts by acquiring an adapter card, or radio card, and an easily attachable, wireless silver-dollar-sized satellite dish antenna. It was thought that listeners would not be required to replace their existing car radios and would be able to use the radio card by plugging it into their radio’s cassette or compact disc slot. Listeners using a radio card would then be able to push a button to switch between AM, FM, and SIRIUS. Radio cards would have a visual display that indicated the channel and format selected, as well as the title, recording artist, and album title of the song being played, and would be portable from car to car. SIRIUS envisioned activation to be accomplished via satellite by calling the company’s customer service center. In 1997, there had not been any agreement between SIRIUS and XM to develop radios using a common technical standard. SIRIUS was expected to launch its satellites between late 1999 and early 2000.

In addition to SIRIUS, traditional radio companies, radio offered through satellite TV (e.g., Music Choice, DMX), and Internet radio formed the competitive landscape for XM. To characterize this landscape, Acker developed a matrix of the major product attributes offered by each competitor

¹³ Dow Jones Online News, “New Venture Rides High On The Promise Of Commercial-Free Radio,” December 25, 1997.

¹⁴ Scott Ritter, “CD Radio Gears Up for 1999 Launch of New Satellite Service,” *Dow Jones News Service*, April 2, 1997.

¹⁵ Dow Jones Online News, November 6, 1997.

¹⁶ Jeannine Aversa, “Companies win licenses to offer new radio service,” *Associated Press Newswires*, April 3, 1997.

¹⁷ Paul Fahri, “Music From the Spheres: Two Local Companies Go Head to Head to Develop Pay Satellite Radio,” *The Washington Post*, May 19, 1997.

¹⁸ Wallace, “CD Radio: radio’s next frontier.”

(Exhibit 6). Though subjective, Acker thought this matrix was useful in distinguishing satellite radio from its competitors when meeting with potential investors or industry partners such as radio or chipset manufacturers. Assuming that both satellite radio companies met the technological and financial hurdles in bringing satellite radio to market, XM had yet to decide how it would clearly differentiate itself from SIRIUS.

Strategic Partnerships and Distribution Channels

XM did not plan to manufacture, hold inventory of, or sell radios/receivers. Acker believed that, rather than find a single manufacturer to build a dedicated XM-band radio, XM should find several partners willing to adapt their future AM/FM receivers to receive XM-band broadcasts as an additional feature. Moreover, CD changers in 1997 were available as aftermarket products¹⁹ and the top-selling configurations used an FM modulator and a small separate display and keypad to allow them to work with existing FM radios in cars. XM envisioned a similar aftermarket solution for customers interested in satellite radio but not in replacing their entire existing car audio system. With these thoughts in mind, XM actively sought to build partnerships with radio manufacturers that had extensive market share and distribution channels in the United States; however, establishing these partnerships posed difficult challenges for Acker. He pondered the following questions:

How do we solve the chicken and the egg problem? We need to convince radio manufacturers that XM will deliver high product volume from the beginning and that they need to invest right now. But how do I convince them to invest now without any conclusive data about whether the technology will work or that people will actually pay for subscription radio?

Before initiating discussions with radio and chipset manufacturers, Acker wanted to develop a solid strategy for each player in the value chain starting with the aftermarket radio manufacturers, which were typically first to bring innovations to market. Establishing agreements with aftermarket companies like Sony, Alpine, and Pioneer would ensure availability of satellite radio receivers until automobile manufacturers could have AM/FM/XM compatible equipment installed in new vehicles through original equipment manufacturer (OEM), or factory-installed, companies like Delphi Delco and Visteon. The stakes were high. According to company estimates, the “car audio” market, including cassettes, AM/FM stereos, speakers, and CDs, etc., was valued at over \$4 billion per year. Factory installed units accounted for approximately \$2.5 billion while the automobile aftermarket accounted for nearly \$1.8 billion. It was expected that the radio manufacturers would need to earn a 30% margin on their sales of the hardware to audio retailers.²⁰ The audio retailers (Best Buy and Circuit City, for example) would typically demand a 30% margin on their retail sales to consumers.

Despite the size of the car radio market, several issues complicated the task of creating the sales pitch for radio manufacturers in addition to the “chicken and egg” problem:

- Acker knew that radio manufacturers had limited resources in terms of personnel and capital and, as a result, were notoriously frugal over which new product development projects to select. It usually required several years and millions of dollars of investment for a radio manufacturer to design, manufacture, and distribute a new product.

¹⁹ “Aftermarket” purchases occurred outside of the car dealership, generally at an electronics retailer like Circuit City or Best Buy.

²⁰ Assume also that the initial designs of XM-equipped radios would cost roughly \$270 for the manufacturers to produce. These data have been disguised.

- Although XM perceived the focus of Wall Street and SIRIUS to be solely on the *car* radio market, it had yet to decide on the amount of resources to spend on portable and/or home radios. This was especially important because most radio manufacturers had a strong presence in one of the two markets but typically not both. (See **Exhibit 7**.)
- Finally, it was Acker's feeling that the best product development talent at these companies was focused on the development of newer CD technology as opposed to seeking changes to an "old" technology like radio. This was particularly true in Japan where Acker felt that radio didn't seem to have the following that it did in the United States.

In addition to initiating partnerships with radio receiver manufacturers, XM was also taking the lead itself in studying alternate technologies for the receiver chipsets, which converted radio signals from satellites into digital sound. Since the chipset for satellite radio was itself a new technology as well as a critical component of the system, XM focused much attention on its development and planned to choose a system design by the end of January 1998. At that point, the company planned to sign contracts with two chipset manufacturers to begin developing the chipsets. XM would license its technology to these chipset manufacturers and would in turn authorize its receiver manufacturer partners to purchase these chips from the chipset manufacturers.

For future product distribution, XM intended to build on its strategic relationships with radio receiver manufacturers. The initial wave of retailers would likely be chosen according to the following criteria: number of store fronts, superior merchandising skills, expertise in selling home and/or car audio, advertising presence, and image. The potential targets would likely include the major consumer electronics chains like Best Buy, Circuit City, and The Wiz. The retailer mix would also likely include a number of smaller mobile audio specialty retailers who historically have developed the market for new mobile entertainment products that require installation. Various promotions targeted at the consumer, such as rebate programs for radio receivers, free introductory subscription packages with receiver purchase, and bundled receiver and subscription purchase packages were still to be explored.

Radio Advertising

Radio advertising was generally purchased in one of three different ways: local, national, or network. These differed along two dimensions: (1) the degree of flexibility that the advertiser had in selecting which markets would hear its ads, and (2) whether or not there was an intermediary between the radio station and the advertiser or its agency. In a "local" purchase of advertising, the advertiser negotiated directly with the radio station, which typically resided in the same geographic area. In most cases, the advertiser purchased time on several radio stations in the market. Moreover, it was not uncommon for some large advertisers to purchase advertising time in several different markets in the same way. On the other hand, a "national" purchase of advertising typically took place through a radio "rep firm." The two largest rep firms in 1997 were Katz Radio and Interep Radio, both headquartered in New York City but with offices in virtually all major cities. Most radio stations throughout the country contracted with one of these firms to sell time on their station to advertisers in different geographic locations. A typical example of a national purchase was the launch of a new movie by a Hollywood studio. In this case, the studio often wanted to purchase advertising on stations throughout the country but without having to negotiate with the hundreds of stations individually. Thus, they contacted the rep firms who each presented a "package" of radio stations across the country. It was typical for the advertiser to purchase from more than one rep firm on a given occasion since the firms differed in terms of the stations they represented in each market.

The third type of advertising, “network” advertising, was associated with syndicated programming. In this arrangement, an advertiser purchased from the syndicator (the firm producing and distributing the programming) a network of all of the radio stations that carried a certain program. For example, one of the most popular syndicated programs in 1997 was the Rush Limbaugh show. An advertiser could purchase time directly from the syndicator, in this case Westwood One, on the entire “Rush Limbaugh radio network.” This provided the advertiser with less flexibility but was often priced at a discount. Radio stations in major metropolitan markets typically derived 75% of their billing from local purchases and 25% from national purchases, though these numbers varied considerably. In smaller markets, the local proportion was roughly the same, but network advertising replaced some of the national business. This was quite different from radio’s Golden Age of the 1930s and 1940s when more than half of radio advertising was purchased in a network fashion.

In all cases, the purchaser of advertising time—whether it was the firm or its advertising agency—was concerned primarily with how well the station’s listenership matched the characteristics of the advertising target. Arbitron, a third-party research firm, performed quarterly studies in each market that reported each station’s listenership in terms of how many people listened as well as how long they listened. These data were typically broken down by age and gender as well as by the time of day. Thus, in selling a station’s advertising time, the salesperson presented data to the buyer in terms of the station’s ability to deliver the listeners that the advertiser sought and how well the station compared to other stations in the market. These data were crucial components of the sale of radio advertising since they provided the buyer with some confidence in terms of who was listening. Unlike other media, however, radio stations seldom provided audience guarantees. As a result, while an advertiser may have purchased advertising several months ahead based on current ratings, if these ratings dropped in the interim, the price was not adjusted.

Two key criteria that advertising buyers sought were “reach” and “frequency.” Reach referred to the number of listeners that an advertiser could expect within a demographic group and during a specific time of day. Frequency was defined as the number of times each listener would hear an ad on average. Since radio formats varied greatly—from rock to talk—the profile of the listeners also varied greatly. The relative ability to target people by gender and age group fairly precisely was considered to be a distinct benefit of radio advertising as compared to other media like television. Successful stations were effective at delivering to an advertiser a large, and relatively homogenous, set of listeners that met specific targeting criteria.

Radio remained a very cost-efficient advertising medium. With an average cost per thousand impressions (CPM) in 1997 of approximately \$6.50, radio advertising was about half the average cost of television or newspapers.²¹ In addition, the growth in costs for radio advertising from 1982 to 1993 was the lowest of major media. Overall, radio advertising revenues in 1996 totalled more than \$12 billion. **Exhibit 8** shows its growth since 1985. XM expected this growth rate to increase in the near future. Analysts predicted a 9.3% compound annual growth rate for the radio advertising market over the next four years, resulting in a total market of \$18.9 billion by the year 2001.²² Despite consistent growth, the radio industry’s share of total advertising expenditures in the United States had remained at roughly 6%–7% of all forms of media throughout the 1990s.

Given the recent industry consolidation, XM expected that a significant portion of future growth in radio advertising would be the result of more aggressive efforts by the large national radio groups

²¹ Lisa Brownlee, “Radio’s Revenue is Getting a Lift from Consolidation, Higher Prices,” *The Wall Street Journal*, June 20, 1997.

²² Steve McClellan, “2001, an \$80 billion odyssey: Veronis Suhler sees 38% ad growth for radio and TV combined over next five years,” *Broadcasting & Cable*, July 28, 1997.

to sell advertising packages that delivered larger audiences in a single national radio buy. If an advertising model was selected by XM, Acker believed that satellite radio would be uniquely positioned to deliver these packages by aggregating specific local niches into a nationwide audience that could be reached easily and efficiently through a single channel or group of channels. XM's service also had the potential to generate additional revenue from new advertisers who might be converted to radio by the advantages of XM's service and through movement of some local advertisers into the growing national market.

But the inclusion of advertising on its stations also presented potential drawbacks for XM. Most critically, commercial-free radio could represent a clear point of difference for satellite radio in contrast to terrestrial radio, and SIRIUS had already publicly committed itself to this model. Moreover, it was not at all clear how product adoption would be impacted if XM's programming contained advertising.

Market Research and Proposed Service Offerings

Acker focused XM's market research on understanding the radio listening habits of potential consumers as well as on forecasting demand for satellite radio among key demographic groups. Publicly available market research in 1997 focused on the habits of car listeners over home listeners since they were the segment of radio listeners closest to the point of purchase of everyday goods and services, an attribute important to advertisers. Trends in home listening versus out-of-home listening also indicated a change away from home listening towards car listening. In 1981, almost 60% of radio listening occurred in the home; however, by 1996 this share of listening had fallen to 39%. Car listening, on the other hand, increased from 22% to 31% during the same period while the remaining share was categorized as "other than home or auto" (e.g., workplace listening).²³

In order to forecast demand for satellite radio, in July 1997 Acker commissioned a national telephone survey. The survey consisted of 80 questions designed to estimate market size and price sensitivities as well as to identify key market segments, service attributes, and the strengths and weaknesses of terrestrial radio offerings. Over 6,000 surveys were completed by more than 4,000 participants residing in urban areas and over 2,000 participants from rural areas. The results of the research formed the basis of XM's approach to targeting and packaging its satellite radio service. Most important for XM, the research was expected to help answer the question of who would be willing to pay for the service and how much they would be willing to pay.

Overall, the study projected that there were more than 160 million listeners potentially interested in the new XM service. **Exhibits 9 and 10** summarize the findings regarding the estimated demand for satellite home and car radios at various hardware and subscription prices, and for various consumer segments. Acker had yet to define the primary target market for the launch of XM.

The study confirmed that as the cost of the radio and subscription was lowered, the size of the potential target market increased. For example, at a radio price of \$100, over 40% of the U.S. population over 14 years old, or 87.1 million people, were identified by the survey as potential \$5 per month subscription customers. Nearly 80% of the population, or 163 million people, made up the potential market for a free service (only paying for the satellite radio receiver). See **Exhibit 10** for projected market demand at various radio receiver price points for different demographic groups.

Based on its market research, XM planned to offer 15–20 channels specifically designed for the young adult market. XM also planned to program 5–10 channels with additional "popular" formats

²³ Veronis, Suhler & Associates Communications Industry Forecast (13th edition), November 1999, p. 173.

attractive to a broader market base including 35- to 54-year-olds and technology friendly consumers. The purpose of these channels was to broaden the overall appeal of XM beyond the otherwise targeted niches and to ensure that the total product offering was balanced with most major formats covered. XM planned to use the remainder of its channels for “boutique” programming. Clusters of channels (1–3 channels per cluster) would be developed to fit with the desires and lifestyles of key segments such as African Americans, Hispanics, business people, or interstate truckers. Included in **Exhibit 11** are XM’s planned channel offerings as of late 1997.

XM was also considering whether to offer its service to listeners through a tiered programming structure in order to maximize demand from price-sensitive consumers, while capturing maximum value from those with high demand and low price sensitivity. For example, they could offer a first tier of programming consisting of only 25 basic subscription channels at one monthly fee. In addition, they might offer a second tier with 15 premium subscription channels available in different packages for an additional fee. XM planned to reserve 10 channels for use as either free-to-air (third-party produced) channels or additional subscription channels. On the one hand, offering a tiered structure would be attractive in that it would allow listeners to design their own service and to select what they wanted to hear. On the other hand, since it seemed that SIRIUS would adopt a single-price subscription service, XM felt pressure to simplify its service offerings.

The Upcoming Road Show

There was no question in Acker’s mind that the next several weeks would be crucial for XM. Upon finalization of the business plan and its review by AMSC and WorldSpace management, their ideas would have to be pitched to investment banks as well as radio, chipset, and car manufacturers. These meetings were scheduled to begin in early December, just over four weeks away, and XM still needed to make some difficult decisions.

Most importantly, XM had yet to decide on a business model. Should it adopt a subscription-only model like SIRIUS, or should it also allow advertising? There might be a trade-off between the loss of listeners and the gain in revenues if XM decided to include advertising on some or all of its channels. Acker needed to develop a better understanding of this trade-off taking into account current radio advertising trends and incorporating the findings of the market research. Further complicating these pricing decisions was whether to offer a single mode of subscription or a tiered programming structure at different price points. Acker knew that resolving these issues was closely related to the selection of the target market. In making these decisions, he also kept in mind that the firm’s expected annual operating expenses (after launch) would be approximately \$200 million to \$300 million.²⁴

A second issue that needed to be resolved was how to approach radio manufacturers. With the launch of any new technology imposing considerable risk, XM needed to understand whether it could convince electronics manufacturers to “bet” on the future of satellite radio and bear the brunt of the design and manufacturing costs, or whether XM should try to raise money and subsidize these efforts. Acker also struggled with the question of how many manufacturers should be contacted. Although more manufacturers might accelerate the speed of adoption, dealing with multiple manufacturers in both aftermarket and OEM might prove hard to manage given the limited resources of XM, and would reduce the potential return to each manufacturer, an important factor given the high cost to enter the market.

²⁴ XM Satellite Radio 10-K Report.

Finally, Acker was also beginning to contemplate how best to direct marketing for product launch. With an expected marketing budget of \$100 million for the launch, Acker felt he had some flexibility in terms of what communication strategy to recommend. Would it be more important to put emphasis on consumer-directed advertising and promotions, or should most of the money be devoted to the sales effort aimed at manufacturers and leading retail chains?

These were the challenges that would be waiting for Acker when he returned to the office the next morning.

Exhibit 1 FM Share of Total (AM/FM) Radio Listenership^a

Survey	FM Share
Spring 1997	77.63%
Spring 1996	76.72%
Spring 1995	76.28%
Spring 1994	75.54%
Spring 1993	74.41%
Spring 1992	74.63%
Spring 1991	74.07%
Spring 1990	73.95%
Spring 1989	73.44%
Spring 1988	71.38%
Spring 1987	71.84%
Spring 1986	68.79%
Spring 1985	66.55%
Spring 1984	64.29%
Spring 1983	62.29%
Spring 1982	58.87%
Spring 1981	57.35%
April/May 1980	54.25%
April/May 1979	50.89%
April/May 1978	47.64%
April/May 1977	44.43%
April/May 1976	40.89%

Source: Adapted from Net Radio, <www.duncanradio.com>.

^aThis table indicates what fraction of listening went to FM stations. It is calculated by dividing the time spent listening to FM stations by the total time spent listening to radio. For purposes of calculation, the Mon-Sun, 6 AM-12 midnight audience estimates were used.

Exhibit 2 Radio Ownership Limits

Year	National Limits		Local Limits		
	AM	FM	AM	FM	Total
Pre-1984	7	7	1		2
1984	12	12	1		2
1992	18	18	2		4
1994	20	20	2		4
1996 (Telecommunications Act)	Unlimited				
1–14 stations in market			3	3	5 or 50%
15–29 stations in market			4	4	6
30–44 stations in market			4	4	7
45 or more stations in market			5	5	8

Source: Company documents.

Note: The above table is read as follows: “Before 1984, a company was allowed to own seven AM stations and seven FM stations throughout the U.S. but only one AM station and two total stations in any single market.”

Exhibit 3 Major Radio Groups, 1997

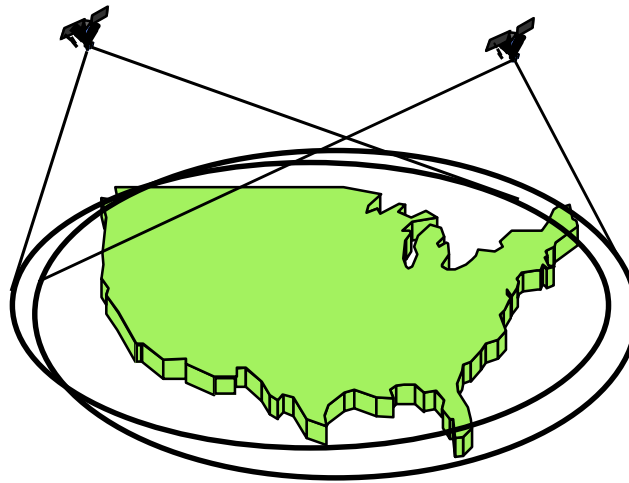
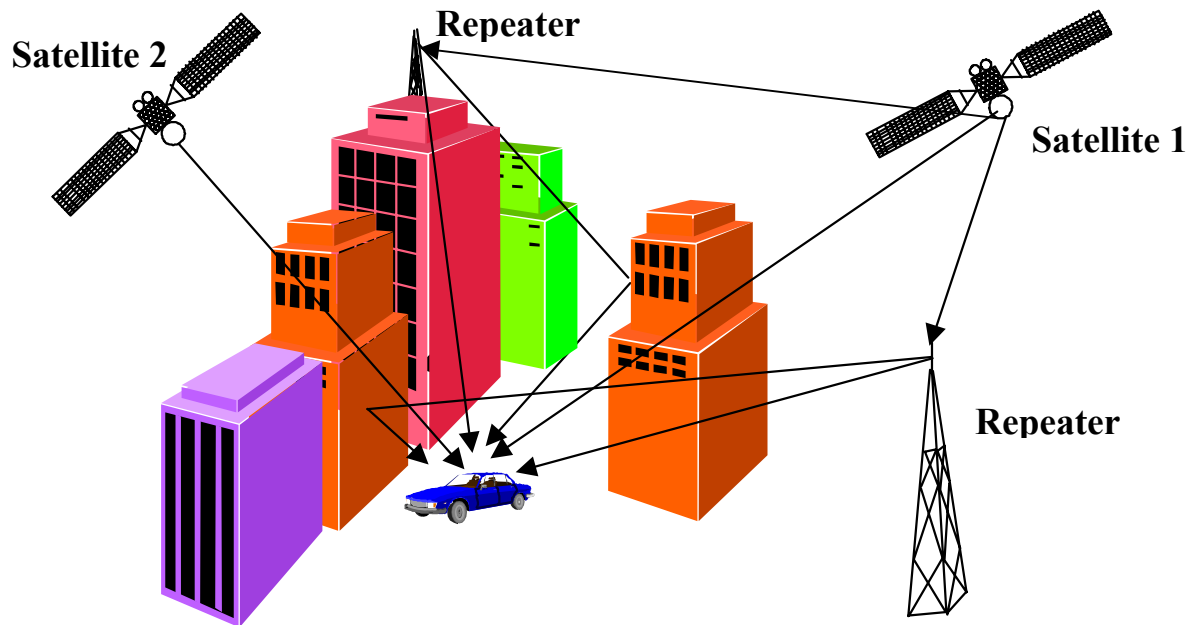
Company	No. of Stations	No. of Markets	Total Metro Cume ^a	Total Annual Ad Revenues
Westinghouse/CBS	76	16	42,576,500	\$1,018 million
Chancellor/Evergreen	97	21	38,597,300	793
Capstar/SFX	315	89	19,536,400	565
Jacor	145	30	15,987,600	502
Clear Channel	163	26	16,695,800	391
American Radio Systems (Westinghouse/CBS)	96	14	15,199,100	381
Disney/ABC	26	10	12,006,400	296
Cox	48	43	8,662,300	218
Emmis	14	5	7,426,900	139
Heftel	37	11	5,969,300	128
Bonneville	14	6	6,160,600	124
Susquehanna	19	9	5,118,000	120
Entercom	24	8	4,381,800	103
Nationwide (Jacor)	19	8	4,377,500	100
Citadel	80	23	4,313,700	100
Greater Media	15	4	4,505,300	91

Source: Company documents.

^a"Cume" = the total number of listeners that listened to a radio station for at least 15 minutes.

Exhibit 4

XM System Architecture

XM space segment*Satellites and Terrestrial Repeaters in Dense Urban Environment*

Source: Company documents.

Exhibit 5 Product Concepts of XM-Enabled Radios for the Car and Home

Source: Company documents.

Exhibit 6 Competitive Summary—XM Perspective

Item	XM	SIRIUS	Terrestrial Broadcasters	Satellite TV and Cable TV	Internet Radio
Programming	Wide Choice of Formats	Wide Choice of Formats	Homogenous with safe/bland shallow playlists	Wide Choice with safe, playlists	Homogenous with safe, shallow playlists
Audio Quality	High	High	High/Medium	High	Medium
Availability					
Fixed	Yes	Yes	Yes	Yes	Yes
Mobile	Yes	Yes	Yes	No	No
Ubiquity/Go Anywhere Coverage	Yes	Yes	No	Yes	Yes

Source: Company documents.

Exhibit 7 Radio Manufacturer Segment Performance

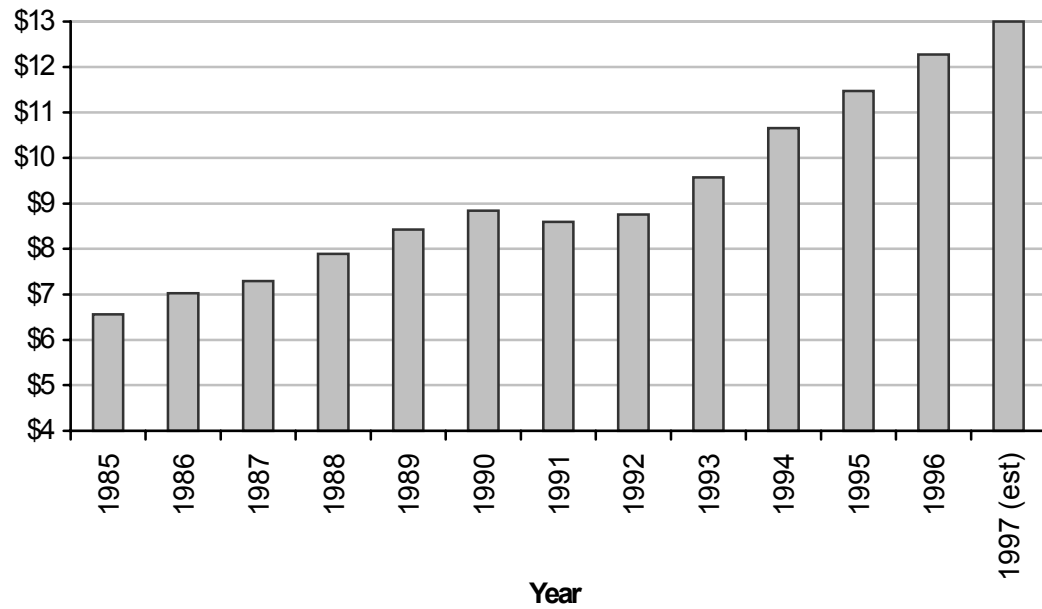
Manufacturer	Market	Market Share	Rank
Matsushita (Panasonic & Technics)	Compact home audio systems ^a	8%	4
	Home receivers ^a	7%	7
	Compact audio systems ^a	8%	4
	Home rack audio systems ^a	33%	1
	Home CD players ^a	11%	3
Sony	Aftermarket car head units ^b	25%	1
	Aftermarket car CD receivers ^b	26%	1
	Aftermarket car CD receivers>\$250 ^c	14%	4
	Home receivers ^a	22%	1
	Home rack audio systems ^a	26%	2
	Home CD players ^a	33%	1
Pioneer	Aftermarket car head units ^b	23%	2
	Aftermarket car CD receivers ^b	23%	2
	Aftermarket car CD receivers>\$250 ^c	17%	2
	Home receivers ^a	17%	2
	Home rack audio systems ^a	13%	3
	Home CD players ^a	13%	2
JVC	Aftermarket car head units ^b	3.1%	10
	Aftermarket car CD receivers ^b	3.1%	9
	Aftermarket car CD receivers>\$250 ^c	5.5%	6
	Home receivers ^a	11%	3
	CD players ^a	8%	4
Sharp	Compact audio systems ^a	12%	3
	Home rack audio systems ^a	9%	5
Hitachi	Home receivers ^a	10%	4
Alpine	Aftermarket car head units ^b	8.1%	4
	Aftermarket car CD receivers ^b	8.0%	4
	Aftermarket car CD receivers>\$250 ^c	33%	1
	OEM car head units ^b	6.9%	5
Clarion	Aftermarket car head units ^b	6.6%	5
	Aftermarket car CD receivers ^b	6.4%	5
	Aftermarket car CD receivers>\$250 ^c	5.3%	7
	OEM car head units ^b	4.9%	7
Delphi Delco	OEM car head units ^b	33%	1
Visteon Automotive Systems (Ford)	OEM car head units ^b	29%	2
Thomson Consumer Electronics (RCA & GE)	Home CD players ^a	7%	6
	Clock radios		

Source: Casewriter, based on the following sources:

^a1995 market share data from Frost & Sullivan.

^b1997 market share data from Venture Development Corporation.

^cIntellect radio market research data.

Exhibit 8 Yearly Radio Advertising Revenues Since 1985 (in \$ billions)

Source: Adapted from Veronis, Suhler & Associates Communications Industry Forecast (13th edition).

Exhibit 9

Millions of people who would purchase satellite radios for the home with a \$12/month subscription^a

Home Radio Price	Male 18–34	Female 18–34	Tech-Seekers ^b	Tech-Friendly ^c	African American	Hispanic/ Other
Definitely @: \$400	2.3	1.1	4.2	2.8	1.4	1.6
Probably @: \$400	7.7	4.2	13.7	10.6	4.5	4.4
\$300	7.9	4.6	14.3	11.1	4.9	4.8
\$250	8.9	5.4	16.3	12.5	5.4	5.5
\$200	10.2	6.3	18.7	14.1	6.0	6.1
\$150	12.2	8.8	23.3	18.8	7.2	7.5
\$100	13.8	10.8	26.9	22.7	8.3	8.5
Total U.S. population falling in segment	33.1	32.1	73.3	82.8	23.7	20.2

Millions of people who would purchase satellite radios for the home with no subscription

Home Radio Price	Male 18–34	Female 18–34	Tech-Seekers	Tech-Friendly	African American	Hispanic/ Other
Definitely @: \$400	4.4	2.6	8.7	5.9	3.0	2.4
Probably @: \$400	16.3	11.9	32.4	26.9	10.7	9.1
\$300	16.7	12.4	33.4	27.7	10.9	9.3
\$250	18.4	13.2	36.2	30.0	11.6	10.2
\$200	21.1	16.7	41.9	37.1	12.8	12.6
\$150	23.9	20.1	48.7	45.0	14.8	14.1
\$100	29.2	27.8	62.3	66.0	19.0	17.6
No answer	3.9	4.3	11.0	16.8	4.7	2.7
Total U.S. population falling in segment	33.1	32.1	73.3	82.8	23.7	20.2

^aDemand forecasts were based on a total population (age 14 and over) of 209.3 million.

^bPeople who agreed with the statement “I love keeping up with and using the latest high-tech products.”

^cPeople who disagreed with the “tech-seekers” statement, but were “interested in new products that make my life easier or better, even if they are a bit high-tech.”

Exhibit 9 (continued)

Cumulative Projected Demand at Various Home Radio and Subscription Price Levels

Radio Price	Subscription Price				
	\$12	\$10	\$8	\$5	\$2
\$400	29,353,177	33,903,924	38,365,587	46,293,194	51,378,366
\$300	30,278,924	35,033,269	39,556,967	47,586,373	52,892,636
\$250	32,381,717	37,657,772	42,730,229	51,591,520	57,327,250
\$200	37,046,978	43,288,544	49,413,977	60,215,846	67,908,028
\$150	42,332,589	49,830,729	56,978,930	70,179,433	79,929,866
\$100	51,163,672	60,570,563	69,670,438	87,143,340	103,272,124

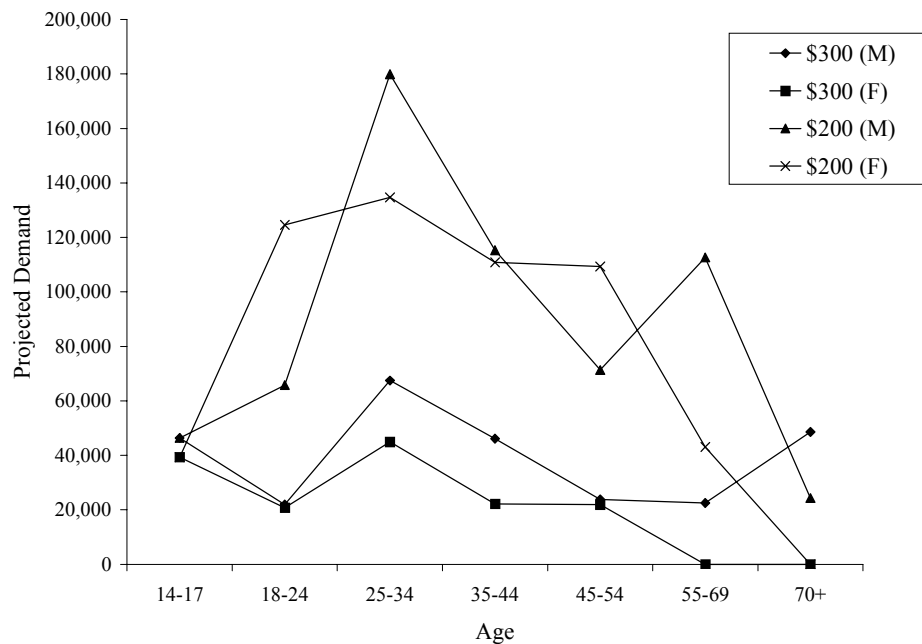
Cumulative Projected Demand at Various Car Radio and Subscription Price Levels

Radio Price	Subscription Price				
	\$12	\$10	\$8	\$5	\$2
\$400	23,682,641	27,404,662	27,484,190	27,590,767	27,714,837
\$300	24,781,778	28,526,070	28,685,126	28,898,280	29,146,420
\$250	26,552,125	30,698,835	31,225,323	31,840,895	32,637,794
\$200	31,470,304	36,515,712	37,829,543	40,490,651	42,806,598
\$150	35,626,570	41,580,232	44,098,158	49,110,199	52,965,846
\$100	45,726,942	54,026,759	58,682,464	68,262,745	77,771,435

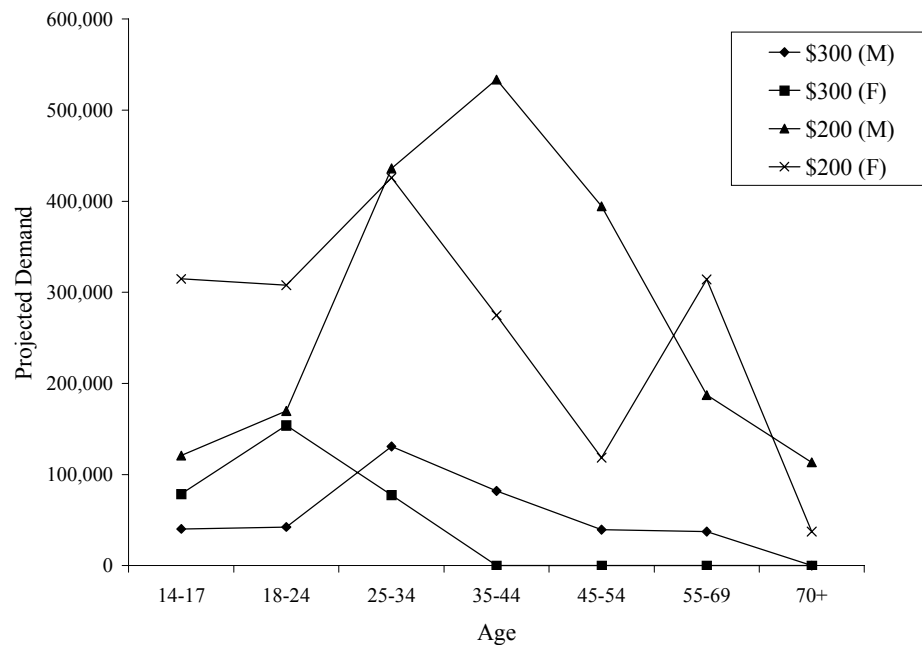
Source: Company documents.

Exhibit 10

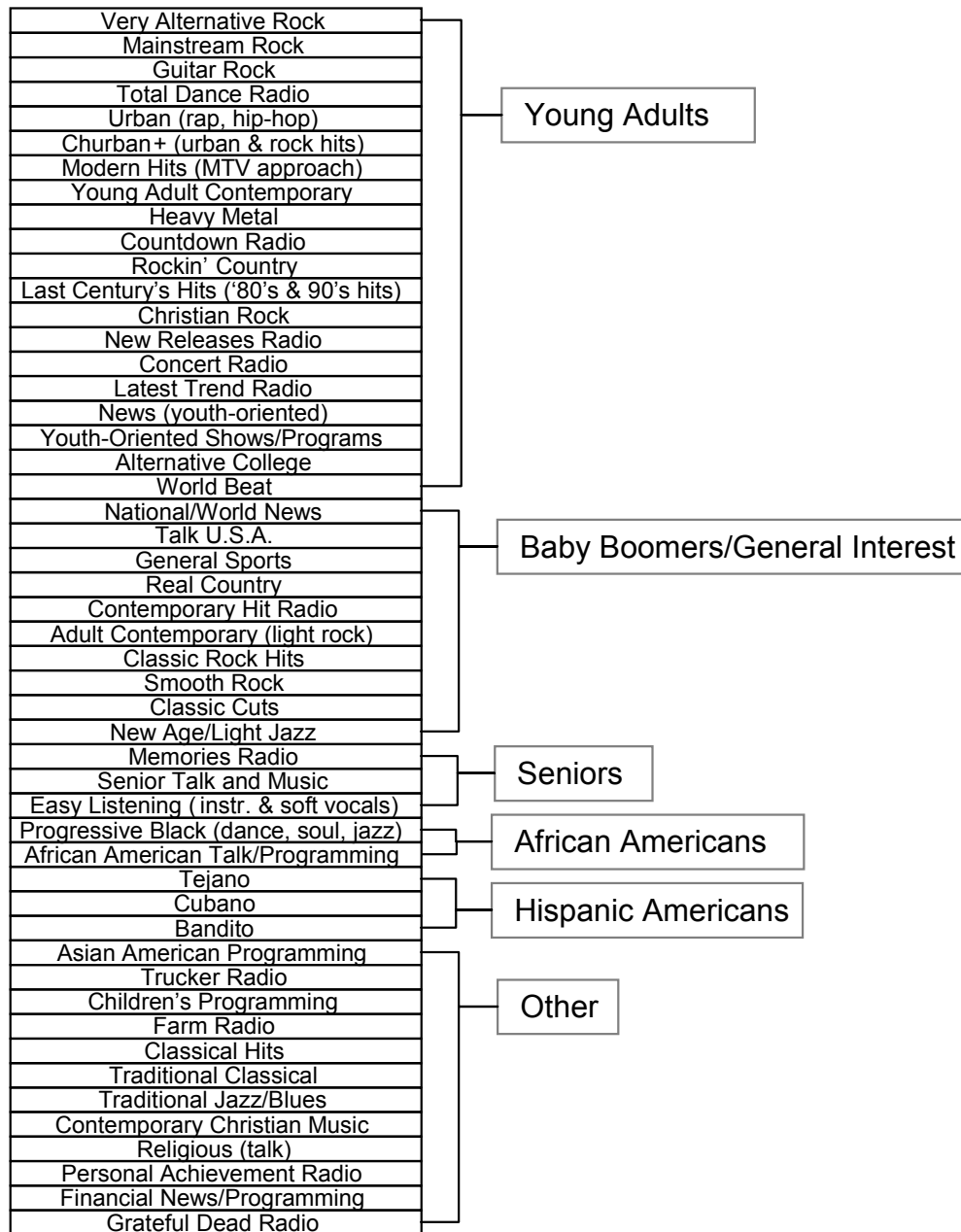
Projected Demand for Satellite Radio in Cars: Rural Areas, \$12/month Subscription
(Grouped by Radio Price and Gender)



Projected Demand for Satellite Radio in Cars: Metro Areas, \$12/month Subscription
(Grouped by Radio Price and Gender)



Source: Company documents.

Exhibit 11 XM Proposed Channel Offerings in Late 1997

Source: Company documents.