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In the Matter of ADJUSTMENT OF RATES AND TERMS FOR PREEXISTING SUBSCRIPTION SERVICES AND SATELLITE DIGITAL AUDIO RADIO SERVICES	)	Docket No. 2006-1 CRB DSTRA

TESTIMONY OF

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TABLE OF CONTENTS

I. INTRODUCTION AND QUALIFICATIONS 1

II. OVERVIEW OF TESTIMONY 2

III. THE SECTION 801(B)(1) FACTORS 4

A. The Effect of Substitution on Price 6

B. The Use of Multiple Benchmarks 8

IV. RATE-SETTING BASED ON THE COMPETITIVE PRICING OF OTHER CONTENT ON SATELLITE RADIO 9

A. Application to Four Statutory Criteria 11

B. Analyzing the Stern Deal 11

V. PRICING BASED ON FINANCIAL SITUATION OF THE SDARS 14

A. Calculating the SDARS Surplus 15

1. Exclusion of Content Costs 15

2. Surplus versus Profits 16

3. Revenue and Cost Projections 17

4. Use of Pro Forma Income Statements 17

5. Surplus per Subscriber 21

B. Dividing the Surplus 21

1. Use of Modeling to Divide Surplus 21

2. The Shapley Solution 22

3. Inputs to the Model 24

4. Model Results 27

C. Derivation of License Fee Based on the Surplus Model for 2012 30

D. Analysis of License Fees for 2007-2011 30

VI. SDARS RATE PROPOSAL 32

VII. PRICING OF PES SERVICES 33

A. Comparability of Cable-Based Digital Music Services and Webcasting Services 34

B. Recommended Rate for Cable-Based Digital Music Services 36

1. PES Rate Structure 36

2. Calculating the Percentage of Revenue Rate 37

3. Calculating Per Subscriber Rate 38

C. Rate Structure Issues 41

APPENDIX I - PELCOVITIS CV

APPENDIX II -- EXPLANATION OF THE SHAPLEY SOLUTION

APPENDIX III -- SUMMARY OF SHAPLEY RUN RELIED UPON IN REPORT

APPENDIX IV -- STEADY STATE SURPLUS ANALYSIS

I. INTRODUCTION AND QUALIFICATIONS

My name is Michael Pelcovits. I am a Principal of the consulting firm Microeconomic Consulting & Research Associates, Inc. ("MiCRA"), which specializes in the analysis of antitrust and regulatory economics. My business address is 1155 Connecticut Avenue, Washington, D.C. 20036.[1]

Since joining MiCRA in 2002, I have prepared reports and testimony on a wide range of applied microeconomic issues, including telecommunications and intellectual property. I testified on behalf of SoundExchange in Docket Nos. 2005-1 CRB DTRA and 2005-5 CRB-DTNSRA. I have also consulted for major corporations in telecommunications and other industries and provided testimony before the Federal Communications Commission, many state regulatory commissions, the Office of Telecommunications ("Oftel") in the United Kingdom, the European Commission, and the Ministry of Telecommunications of Japan.

Prior to joining MiCRA, I was Vice President and Chief Economist at WorldCom. In this position, and in a similar position at MCI prior to its merger with WorldCom, I was responsible for directing economic analysis of regulatory and antitrust matters before federal, state, foreign, and international government agencies, legislative bodies, and Courts. Prior to my employment at MCI, I was a founding principal of a consulting firm, Cornell, Pelcovits & Brenner. From 1979 to 1981, I was Senior Staff Economist in the Office of Plans and Policy, Federal Communications Commission.

I have lectured widely at universities and published several articles on telecommunications regulation and international economics. I hold a B.A. from the University of Rochester *(summa cum laude)* and a Ph.D. in Economics from the Massachusetts Institute of Technology, where I was a National Science Foundation fellow.

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[1] A copy of my curriculum vitae is attached as Appendix I.

II. OVERVIEW OF TESTIMONY

I have been asked by counsel for SoundExchange to analyze its recommended rates for the compulsory license fee to be set in this proceeding for the digital audio transmission of sound recordings by eligible preexisting satellite digital audio radio services ("SDARS") set forth in 17 U.S.C. § 114(j)(10), and for preexisting subscription services ("PES") operating under the statutory licenses set out in 17 U.S.C. § 114(j)(11). Based on my analysis, discussed in the following sections, I find the SoundExchange proposed rates to be economically justified and consistent with the policy directives set out in 17 U.S.C. § 801(b)(1).

In reaching my conclusions, I reviewed the academic literature on music licensing, the trade press covering the satellite radio industry, research reports by a variety of financial analysts who follow the industry, surveys on consumer attitudes towards satellite radio, and the economics literature on cooperative games and the Shapley value solution to such games. I also reviewed and relied upon the testimony of Mr. Sean Butson, Dr. Yoram Wind, and Dr. Janusz Ordover. I rely in particular on Mr. Butson's financial analysis, Dr. Wind's survey evidence, and Dr. Ordover's economic analysis.

My report is organized in the following manner. In Section III, I explain the logic of the approaches I use to derive rates consistent with the statutory factors, and I explain how those approaches complement the analysis provided by Dr. Ordover. Further, I explain the significance of the substitution effect of the SDARS service on other forms of music listening to pricing under the four statutory factors.

In Sections IV and V of my testimony I offer two methods for identifying appropriate pricing for the SDARS services.

I set out the first economic framework in Section IV of my testimony. That approach relies on data concerning the amounts the SDARS paid in competitive market transactions for

non-music content available on their services. For example, we have information on Sirius's payment for Howard Stern's programming, the financial benefit Sirius expected as a result, and the financial benefit Sirius obtains from the sound recordings it offers. I extrapolate from this information and derive a rate for the blanket license for sound recordings at issue here. This analysis suggests that the SDARS should be paying at least 24.5% of revenue or $2.94 per subscriber per month for sound recordings in the final year of the statutory period.

The second framework I develop is set out in Section V of my report. It relies on empirical data reflecting the SDARS' costs and revenues and on standard economic modeling techniques. When an SDARS has achieved a scale that allows it to be a stable and profitable enterprise, it pays for content out of revenues it collects from the customers it expects to attract, after paying the other costs necessary to operate its service. Reliable projections of the SDARS' expected revenues in 2012 at the end of the license term, and reliable projections of its expected costs over the same period, allow me to identify the pool of surplus revenue that will be divided among the various content providers and the SDARS' shareholders at a point when the SDARS themselves claim they will be profitable, self-sustaining, businesses. I analyze that data in the first subsection of Section V. It shows that each SDARS customer will generate a surplus of approximately $4.67 per month at the end of the statutory period.

Before that data can be used to generate a rate, I must allocate to the sound recording copyright holders their appropriate share of that surplus revenue. In the second subsection of Section V, I divide that surplus among the various content providers and the SDARS themselves. In doing so I rely on the results of survey data collected for this proceeding by Dr. Wind. I then make use of what is called a "Shapley" solution to a game theory model to divide the surplus based on Dr. Wind's results. The Shapley solution is a standard and well-known economic

technique for dividing a surplus among multiple parties contributing to an ultimate product -- here the SDARS themselves and the various content providers. I conclude that the sound recording copyright holders are entitled to approximately 62% of the surplus generated by the SDARS when they become stable and profitable businesses. That translates into a rate in 2012 of $2.90 per month per subscriber, or 24% of revenue.

In Section VI of my report, in light of these two different modeling approaches, I address SoundExchange's rate proposal for the SDARS. I conclude that SoundExchange's proposed rate is consistent with both of my models and with the four statutory factors. That rate starts at the greater of $1.10 per subscriber per month or 10% of revenue in 2007, and ends at $2.75 per subscriber per month or 23% of revenue in 2012. The rate sensibly follows a "greater of" rate structure common to certain marketplace agreements.

Finally, in Section VII of my report, I analyze SoundExchange's proposed rate for the PES. That rate in the first year of the statutory license is the greater of 15% of revenue or $.05/subscriber/month, rising each year and ending at the last year of the license at 30% of revenue or $.25/subscriber/month. I find that rate consistent with the statutory factors, based on a comparison with the rate I previously proposed in CRB DTRA Docket No. 2005-1 (the "webcasting proceeding"), making adjustments for the differences between the services, and also for the different statutory standards that apply in the webcasting proceeding.

III. THE SECTION 801(B)(1) FACTORS

This Court faces a difficult task in setting the price for the compulsory license. It is required to fashion a rate designed:

> To maximize the availability of creative works to the public;
>
> To afford the copyright owner a fair return for his creative work and the copyright user a fair income under existing economic conditions;

> To reflect the relative roles of the copyright owner and the copyright user in the product made available to the public with respect to relative creative contribution, technological contribution, capital investment, cost, risk, and contribution to the opening of new markets for creative expression and media for their communication; and
>
> To minimize any disruptive impact on the structure of the industries involved and on generally prevailing industry practices.

17 U.S.C. § 801(b). The statute offers no guidance on how to translate these policy goals into a concrete rate. Even an exhaustive consideration of each side's "technical contribution," for example, would not point the Court to a particular rate or rate structure.

Dr. Janusz Ordover is submitting testimony analyzing the statutory factors and describing how economists would effectuate these policy directives in rate-setting. I adopt Dr. Ordover's view that here, the policy objectives set out by Congress are most fully satisfied by rates that would be the likely outcome of marketplace negotiations among the individual record companies and the individual SDARS. In what follows I identify rates that would be derived in such a competitive marketplace, were it to exist. That analysis is supplemented, however, by consideration of the fourth factor, which reflects policies that may be, but are not necessarily, consistent with results from the competitive market.

As Dr. Ordover explains, the critical determinate of the market (and fair) price of sound recordings ultimately is the value those sound recordings have to the consumers who purchase them. That is one reason why the rates sound recordings obtain in free market transactions are relevant to the rates that should be set here. Rather than repeat Dr. Ordover's explanation, I offer two additional and related points, one theoretical, one practical.

A. The Effect of Substitution on Price

It is important to consider the potential for one type of music distribution mechanism to substitute for others. If a license is set artificially low for the music provided through one distribution media, this will result in marketplace distortions due to an inefficient substitution between one mechanism and the others. It will also reduce the expected revenues of the owners of the sound recording copyright[2] and lead to less creative effort by artists and record companies over the long run.

There are many different ways that consumers listen to music, and they are not perfect substitutes for each other. Some are better suited for home, some for the car, some have higher sound quality than others, and some give the consumer more choice, to name just a few obvious distinctions. While acknowledging these distinctions, it is also the case that these services are all fundamentally similar because they all provide sound recordings to consumers.

Consequently, the services to a greater or lesser extent substitute for each other. There are only so many hours in the day, and only so many dollars that a consumer can devote to music purchasing in particular, or to leisure activities in general. A person who listens to music primarily while commuting to work has a choice: he may listen to satellite radio, he may play a CD, or he may plug his iPod into his car stereo system and listen to pre-recorded music. If consumers choose satellite radio for the car, they will to a greater or lesser degree stop playing CDs in the car. That is highly likely to translate over time into fewer CD purchases.

This point is not lost on the SDARS. They offer the substitution value of their service as a selling point. On their web pages they prominently feature testimonials by their customers that

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[2] I am aware here that SoundExchange's royalty is shared between the copyright holder and the artist. In my testimony when I refer to the sound recording copyright holder's royalty or share, I intend to refer to payments to SoundExchange for the benefit of both the copyright holder and the artist.

satellite radio customers no longer need to purchase CDs.[3] Analysts who study the music industry are focused on this proceeding because they also believe that as the SDARS grow in scale, the substitution effect of unreasonably low royalty rates will harm the music industry.

[3] http://testimonials.xmradio.com/, captured on October 18, 2006; http://testimonials.xmradio.com/xm_experience/xm_experience_more.html, captured on October 18, 2006; http://www.sirius.com/servlet/ContentServer?pagename=Sirius /Page&c=WhatIsHome&cid= 1107787276710, captured on October 18, 2006.

[redacted]

Because of the substitution effect the SDARS create, failure to set a royalty rate at a level commensurate with the rates copyright holders obtain in other free market transactions will have harmful consequences. A relatively low input price to the SDARS in the end will translate into a relatively low retail rate. That in turn will lead customers to choose the SDARS over other forms of music listening, not because they are necessarily more efficient, but because the SDARS are underpaying for music. Other, perhaps more efficient or better forms of music distribution therefore will be disadvantaged. That, in turn, will lead to downward pressure on the price sound recordings get in marketplace transactions. In turn, this will lead to fewer and possibly lower quality sound recordings being made. These policy results are the very opposite of the policy results set out in the four statutory factors.

B. The Use of Multiple Benchmarks

My second point is a practical one relating to the application of data and economic reasoning to a complex market. There are a number of possible approaches that can be applied to develop a rate that satisfies the statutory criteria. The Court therefore should not rely simply on one benchmark or data set, but rather should engage in triangulation -- relying on the results derived using different economic methodologies and different sets of empirical data, and then

[4] CitiGroup Global Markets, Warner Music Group, Sept. 22, 2005, at 35-37 (emphasis in original) (SX Ex. 103 DR).

selecting within that range the rate that best accommodates the statute's purposes. Such an approach has two advantages.

First, it makes the best use of all of the relevant empirical evidence. There is a growing body of evidence that ought to inform this Court's rate determination. Each type of evidence has probative value and brings a different perspective to the case. A rate that is supported by multiple measures is more likely to be an appropriate one.

Second, this approach makes the best use of economic reasoning and methodology. There is no one "correct" method of economic analysis that will yield a result that best accomplishes the four statutory policy goals. Instead, there are different economic tools that can be applied to consider the relevant evidence. The most sound result therefore will come from taking account of all of the evidence, rather than adopting a single approach. I offer two approaches here, and Dr. Ordover offers others in his testimony. Together our reports offer a substantial body of information that I believe correctly defines a range of rates that best satisfy the statutory criteria.

IV. RATE-SETTING BASED ON THE COMPETITIVE PRICING OF OTHER CONTENT ON SATELLITE RADIO

Based on my analysis of the prices the SDARS pay for other content, a comparable return to sound recording rights holders would equate to 24.5% of SDARS' total revenues, or $2.94 per customer per month at the end of the statutory period. As I explain, that figure is a well-supported real world benchmark that fully satisfies each of the statutory criteria.

The market price the SDARS would pay for sound recordings should be consistent with the market prices already paid for other content. This data is also instructive because fairness is a statutory objective. It is fair that each input to the SDARS' services (*e.g.*, sound recordings, Howard Stern, the NFL) should be paid in proportion to the value it contributes to the SDARS'

business. In this section, I look at one well-defined example of non-music content, about which there is the most information available in the public domain: the amount Sirius paid for the right to carry Howard Stern's programming.

SDARS purchase rights to content to attract subscribers. Because the value of content is directly related to its ability to attract subscribers, different kinds of content are substitutable inputs.[5] An SDARS will choose to spend more money for one kind of content than another, and will adjust its spending on programming to get the most revenue for its content expenditures.

The economic justification for this comparison is straightforward. Marginal product is defined in economics as the change in the firm's output with respect to a change in a particular input.[6] For the SDARS, the marginal product of alternative programming is the number of subscribers attracted. The ratio of marginal products to prices should be the same across substitute inputs.[7] Specifically, the ratio of the prices of any two inputs should equal the ratio of their marginal product. The more programming attracts and retains subscribers, the more valuable it is, and the more the SDARS would pay for it. In non-technical terms, the amount Sirius paid for Howard Stern and for other content on a per-customer-acquired basis ought to equal the amount Sirius would pay for sound recordings on a per-customer-acquired basis.

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[5] Even where different forms of content may not be substitutes for the *same* subscribers, they are still substitutable inputs for the SDARS. Some subscribers may like only sports, and others may like only shock jock programming. But for the SDARS, if the spending on each form of programming is out of proportion to the number of subscribers attracted by the programming, then it will pay to shift spending away from the content type that is attracting relative few subscribers, and increase spending on other content where the spending generates more subscribers.

[6] David Besanko and Ronald R. Braeutigam, *Microeconomics, An Integrated Approach,* John Wiley and Sons, 2002, at 226.

[7] *Ibid*, at 272.

A. Application to Four Statutory Criteria

This approach addresses particularly well the first and second of the four statutory criteria. SoundExchange is not fairly compensated under the compulsory license if sound recording payments, relative to the value sound recordings provides, are lower than the comparable market-based payments to other content providers. Moreover, where sound recording rights holders alone are undercompensated relative to a competitive market standard, sound recordings will be undersupplied relative to other programming in the long run. That outcome directly undermines the first statutory goal of "maximizing the availability" of sound recordings, and it disserves consumer welfare.

This approach also is consistent with the other statutory factors. As to the third factor, the SDARS would not have agreed to rates in marketplace transactions for content unless such transactions made economic sense, that is, were likely to lead to revenues from subscriber gains greater than the amount spent, and left the SDARS sufficient revenue to make the necessary capital investment in their satellite networks. Thus, these marketplace transactions demonstrate the SDARS' own judgments about the value of content within the context of their own business model, and the needs of their investors to recover, over time, the necessary risk-adjusted rate of return to satisfy their investors. In that way, the market itself rewards risk and the contribution to social welfare. Using the SDARS' own content deals as a benchmark necessarily also is consistent with the fourth statutory factor. The SDARS would not enter into transactions that they believed would be destructive of their own businesses.

B. Analyzing the Stern Deal

There is good market information on the prices paid for other content and the number of subscribers that SDARS believe that content attracts. The best and most complete data I have been able to collect concerns Howard Stern's contract with Sirius, so I will use that data to

develop a comparable rate that Sirius would be expected to pay for sound recordings in a market transaction.[8]

Sirius paid Howard Stern approximately $415 million in net present discounted value for the rights to carry Stern's programming for five years.[9] Financial analysts, some of them briefed on the Stern transaction by Sirius, generally put the number of incremental customers Sirius expected to gain from Howard Stern's programming at less than 1.75 million net customers.[10] I use 1.75 million customers as the starting point for my analysis. From there, it is a straightforward matter to calculate how much Sirius believed it was worth to pay for content that

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[8] Because there are no major relevant differences in this regard between Sirius and XM, the Howard Stern data should provide good evidence of a market-based sound recordings rate that applies to XM as well as to Sirius. Moreover, I expect that after discovery in this case, SoundExchange will have obtained data making it possible to use this same methodology to analyze data concerning the SDARS' agreements with other content providers.

[9] Stern's deal with Sirius called for payments of $180 M in stock and cash, plus $80 M in cash, in each of the next four years of the five year contract. *See* Kagan Research, *Satellite Radio Outlook,* 2005, at 65-67. Discounting these payments back to year one using Sirius's 12% cost of equity yields a present value of $415 million. This is a conservative valuation for two reasons. First, I assume that Sirius funded the entire Stern transaction out of equity, rather than a blend of equity and lower cost debt. Second, Stern's deal also included other payments based on Sirius's subscriber growth. Sirius achieved these growth targets in 2006, and apparently Stern was paid another $150 million. *See* "Stern Compensation at Sirius Higher Than Expected," *Forbes.com*, August 15, 2006. The incentive payments were part of the original agreement, but valuing them at the time the contract was negotiated involves a number of subtle issues. To be conservative, I value these incentive payments at zero. I fully expect that discovery will allow me to place a better value on these incentive terms, as valued by Sirius, when the Stern contract was negotiated. Given my conservative assumption that these incentive clauses have zero value, of course, better information will only lead to an increase in the price Sirius expected it was paying for Stern when the contract was negotiated.

[10] Analysts concluded that Sirius believed that Stern would bring 1.6 million or fewer new customers to its network. *See, e.g.,* Kagan Research, *Satellite Radio Outlook*, at 65 (1.6 million); *see also* bridgeratings.com 7/8/2006 ("Our latest estimate is that a total of 1.35 million (11%) of Stern's fan base has migrated to Sirius"). Because Stern negotiated an exclusive deal with Sirius, however, he should be given credit for the customers Sirius would have lost to XM had Stern signed with XM rather than Sirius. It is not clear from the analysts' description of Sirius's expected subscriber growth due to Stern whether they have included this cannibalization effect or not. Therefore, to account for this phenomenon, for purposes of this exercise I make the assumption that Sirius would give Stern credit for 1.75 million new customers, including those who left XM to subscribe to Sirius because of Stern.

would attract an individual subscriber. Sirius paid $237 per subscriber to Stern for the incremental subscribers ($415 million divided by 1.75 million subscribers). Further, using a 42 month average life for the typical Sirius customer,[11] I calculate that Sirius paid Stern about $5.64 per month for each incremental subscriber ($237 divided by 42).[12] According to Mr. Butson's testimony, Sirius is expected to generate $10.25 per subscriber per month in 2006, rising to $11.65 in 2010 (the last year of Stern's contract).[13] This implies that Sirius paid Stern from 48% ($5.64/$11.65) to 55% ($5.64/$10.25) of revenue for each subscriber that his programming attracted to Sirius. That makes an average of slightly above 50% of revenue.

This analysis establishes that the SDARS themselves recognize that content that is essential to attracting a particular group of customers is able to capture a substantial portion of the SDARS' revenues derived from those customers. The 50% figure ought to apply equally to music content as to Stern, since a large catalog of music is essential to a music-based service and attracts customers to Sirius just as Stern attracts customers. Subscribers attracted to Sirius solely because of Howard Stern are a small subset of the total population of Sirius subscribers. Other content deserves a similar percentage of the customers *they* bring to Sirius. These figures need to be adjusted so that they apply to that share of the customer base that can be attributed to sound recordings in the same sense that Stern's 1.75 million customers are attributed to Stern.

Dr. Wind's survey evidence indicates that about 56% of all of Sirius's subscriber revenues would be lost if it offered no music channels.[14] This revenue should be attributed to

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[11] *See* Butson Report at 16.
[12] Sirius Satellite Radio, 2005 Annual Report and Proxy Statement, at 5.
[13] I am excluding the advertising revenue per subscriber, because I have no information on the split of this revenue between Sirius and Howard Stern.
[14] Dr. Wind's survey shows that 56% of Sirius's subscribers would either cancel (41%) or reduce the amount they are willing to pay to an average of $7.27 (15%). Since the price cut to keep those who would buy Sirius without music at a lower price is so large, it would not be profitable

sound recordings, in the same way that the revenues from 1.75 million customers are attributed to Stern. If music content were to receive 50% of the revenue for the 56% of the customers attracted to the SDARS by music, that is equivalent to 28% (50% x 56%) of the revenue associated with *all* of the SDARS' customers. In other words, based on what Sirius paid for Howard Stern's programming, in a similar marketplace transaction I would expect music content to receive approximately 28% of revenue for use of its licenses. Assuming as analysts do that the music publishers received 3.5% of that revenue, this would leave a SoundExchange royalty of approximately 24.5%.

In sum, if Sirius paid the sound recording owners an amount comparable to what it paid Howard Stern in an open marketplace transaction, it would pay approximately 24.5% of revenues to SoundExchange over the entire license period. Based on an average revenue per subscriber of about $12.00 in 2012, this would be the equivalent of about $2.94 per subscriber per month.

V. PRICING BASED ON FINANCIAL SITUATION OF THE SDARS

In this section, I perform an analysis of the SDARS' finances, and derive a rate based on that analysis. First, I calculate the revenues the SDARS likely will generate in 2012 when by their own account they will be mature and profitable businesses. I subtract from that number all of the SDARS' costs during that period, including a reasonable portion of a profit for their investors, *other than* the costs of the content they provide over their satellite systems. The result is the surplus generated by their business. That surplus can then be divided up among the various content providers and the SDARS themselves to the extent they earn a profit above and beyond the normal rate of return a business of their type would expect to generate. I then make

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for Sirius to cut the price for all customers to $7.27. Thus, Dr. Wind's survey results indicate that Sirius could be expected to lose 56% of its revenues if it offered no music.

use of economic modeling to propose an optimal allocation of that surplus among the SDARS' shareholders and the various content providers.

My results show that in 2012 the SDARS will obtain surplus of $4.67 (in 2007 dollars) per customer per month, above and beyond their costs and a reasonable rate of return on capital. Economic modeling shows that sound recording rights holders would derive 62 percent of that surplus, or $2.90 per subscriber per month at the end of the statutory period if the rate were negotiated in the market.

A. Calculating the SDARS Surplus

The first step in my analysis is to compute the pool of SDARS revenues in excess of all non-content related costs. This pool, which I term the SDARS' "surplus," is the potential economic profit flowing from the consumers' willingness to pay for SDARS service with all of the content now being made available. The surplus then is available to be divided among the SDARS and the content providers. If the content providers were to receive no payment (which is, of course, an impossible outcome), then the SDARS would collect the entire surplus. Conversely, if the SDARS behaved like fully competitive firms, which by definition earn no excess profits or surplus beyond a reasonable rate of return on their investment, the content providers would collect the entire surplus generated by the SDARS.

1. Exclusion of Content Costs

I exclude all content costs from my calculation of the surplus because that approach best satisfies the statutory factors, and in particular the first two statutory factors. It would be unfair to sound recording rights holders, and it would not maximize the availability of creative work to the public, if the sound recording royalty was based only on whatever happened to be left of the SDARS' surplus after the SDARS had made their deals with all of the other content providers. This approach also best satisfies the way that a content provider would approach a negotiation

with the SDARS in the real world. No content provider would accept an argument from an SDARS in a negotiation in the form of "we wish we could pay you more, but we gave all of our profit away to your competitor content provider x. So you will just have to take the little that is left over." For these reasons, in my analysis, content provider costs are left out of the cost calculation used to calculate the surplus.[15]

2. Surplus versus Profits

The surplus to be divided among content owners and the SDARS is very different from the conventional notion of profits. Non-economists use the term "profits" synonymously with the earnings (or income) of a firm. Since corporate earnings are primarily compensation to the stockholders for providing the firm with capital, much of these earnings are necessary costs of doing business, and are not a "surplus" generated by scarcity. Therefore, to limit the "pie" to be divided among the players to the actual economic surplus generated by SDARS, I include the cost of the capital necessary for the fixed asset infrastructure needed to provide the service. In other words, the parties will share in the excess profits that can be earned by the SDARS, above and beyond their normal (*i.e.*, competitive) return on capital.

In this sense, my approach gives the SDARS their "profit" in two different ways. First, before the surplus even is divided, the SDARS are given a reasonable rate of return on the investment needed to build an SDARS network -- funds to pay their shareholder and bondholders. Second, the SDARS also participate in sharing the surplus created by their business. In this way, I modeled a result that I would expect to see in the real-world marketplace in which the SDARS operate.

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[15] Musical works copyright costs are, however, included in the SDARS' costs before any surplus is calculated.

3. Revenue and Cost Projections

The necessary revenue and costs projections are easy to obtain. The SDARS are large publicly-held companies with publicly reported expenses and publicly reported revenues. There is also a substantial body of analysts' reports that provide valuable insight into that data, and informed projections of those costs and revenues as the SDARS gain additional customers and grow to become profitable enterprises. In particular, I base this surplus analysis on the pro forma income statements for XM and Sirius for 2012 presented by Mr. Butson. I distill Mr. Butson's key revenue and cost estimates to present surplus estimates on a per subscriber per month basis for an "average" SDARS, which is intended to be representative of either XM or Sirius. This analysis accounts for all of the SDARS' costs, including the fixed and sunk costs of launching the satellite system, and a risk-adjusted return on that investment. Since these fixed costs are high, the value of the surplus pool (on a per subscriber basis) will be greater the larger the number of subscribers. As indicated above, payments to content providers are not included as a cost of the SDARS, because these payments are determined by the solution to the bargaining over the surplus, which is discussed in the next section.

4. Use of Pro Forma Income Statements

My estimate of the surplus is an attempt to capture economic profits for a business that has reached a degree of maturity. Use of the pro forma income statement for this purpose is most defensible when the business is stable and mature. I therefore use the 2012 year with the pro forma analysis because (as well as representing the last year of the statutory license period) it is a period when the SDARS by their own account will be stable and profitable companies. Pro forma income statements are much less useful to analysis when companies are just starting out, have not yet achieved profitability, or are in periods of rapid growth. That is because, among other reasons, companies in this situation typically are spending a great deal of money investing

in their future. By definition, the revenue they anticipate in return from that investment has not yet appeared on their books. In that situation, the snapshot of an annual pro forma is misleading, and adjustments need to be made to income statements to give a clear picture of a company's financial situation.[16]

The table below reproduces the major categories of revenues and costs reported in Mr. Butson's pro forma income statement of 2012 for XM and Sirius. Costs are broken down into several categories, including fixed costs, semi-fixed costs, and variable costs. As Mr. Butson describes, several categories of costs have different meaning for the two companies. For present purposes, the critical thing is that I included for each company all of their costs.

[16] I address this issue later, *infra* pp. 30-32, when I discuss SoundExchange's proposal to adjust rates downwards in earlier years of the statutory license.

SDARS 2012 SURPLUS CALCULATION
(in thousands of dollars)

	XM	Sirius
Number of Subscribers	**19,221,032**	**19,113,777**
Total Revenue	**$3,243,201**	**$3,152,784**
Revenue Share (est.)	$339,164	$320,135
Royalties (est.)	$113,512	$110,347
Customer Care and Billings	$196,930	$203,418
Cost of Merchandise	$92,694	$18,950
Ad Sales	$50,033	$0
Subsidies and Distribution	$468,841	$385,588
Variable Costs	**$1,261,175**	**$1,038,438**
Advertising and Marketing	$274,453	$346,587
Retention and Support	$39,428	$0
Semi-Variable Costs	**$313,881**	**$346,587**
Satellite and Terrestrial	$60,287	$35,569
Broadcast	$25,214	$0
Operations	$44,135	$0
R&D	$46,704	$75,430
G&A	$66,651	$132,377
Fixed Costs	**$242,992**	**$243,376**
Capital Cost	**$228,820**	**$228,820**
Total Costs	**$2,046,867**	**$1,857,221**
Surplus	**$1,196,334**	**$1,295,563**
Surplus Per Customer Per Month	**$5.19**	**$5.65**

This calculation includes a category of costs not included in Mr. Butson's financial analysis -- capital costs for the investment necessary for the capital required to maintain the infrastructure needed for the business. This is represented by an annual cost factor, which would compensate the owner of all the fixed assets used by the SDARS to provide service. This capital cost would be defined in economics as the "normal" return that would be generated in a

competitive market. I calculate this cost factor by applying a rental rate formula to an estimate of the fixed assets needed by SDARS providers.

I base my estimate of this annual capital cost factor using information from Sirius's latest annual report, as well as data from Mr. Butson, and other financial analysts. I estimate the total cost of the capital equipment from Sirius's financials, because the XM financials are complicated by the shortened life of the satellites they initially launched. I begin with the net book value ($828 million) of Sirius's property and equipment as of December 31, 2005.[17] I then add the cost of the additional satellite ($260 million) that Sirius expects to launch in 2008. The sum of these two figures is $1088 million.

I calculate the monthly payment necessary to recover the cost of the equipment together with a return on outstanding capital (*i.e.*, a rental rate). This requires estimates of the expected life of the equipment and the cost of capital. I estimate an expected life of 9.5 years and a cost of capital (grossed up for corporate income tax) of 16.67%.[18] This yields a monthly capital cost charge of $19 million, or an annual charge of approximately $228 million.

The use of a capital cost factor allows me to compensate owners of the capital needed to build an SDARS business. It spreads all cost associated with capital evenly over the entire life of the capital. By contrast, accounting treatment of these costs yields a much less even recovery of costs over the life of the capital and does not treat the return on equity as a cost. This "levelization" of capital cost is similar to the methodology used in rate-setting for regulated industries, where the goal is to establish stable rates for services, which compensate the regulated firm for the costs of capital. I adopted this approach because it allows me to separate the role of

[17] Sirius Satellite Radio, 2005 Annual Report and Proxy Statement, at 27.
[18] I assume a capital structure that is one-third debt and two-thirds equity; a debt cost of 10%; an equity cost of 12%; and a 40% tax rate.

the SDARS as the operator of the satellite radio equipment, from its other role as a duopolist whose financial situation is affected powerfully by the history of previous payments to content providers and its own entrepreneurial skills.

5. Surplus per Subscriber

The surplus calculation shown above on a per subscriber basis is $5.19 per month for XM and $5.65 per month for Sirius. The simple average of these two numbers is $5.42, which is the surplus I use to derive my rate recommendation for this case for 2012. Since SoundExchange's rate proposal includes an adjustment for inflation between 2007 and 2012, I deflated this 2012 surplus to 2007 dollars. Assuming a three percent inflation rate between 2007 and 2012, $5.42 in 2012 dollars yields a surplus of $4.67 in 2007 dollars, to be divided among the various content providers and the SDARS themselves.

B. Dividing the Surplus

I next calculate the share of the surplus that should be allocated to SoundExchange.

1. Use of Modeling to Divide Surplus

Cooperative game theory provides a natural and intuitive economic framework for accomplishing this surplus allocation. Not only does cooperative game theory mimic the results of a real life negotiation, it also captures the fairness concerns set out in the second statutory factor.

Cooperative game theory addresses the question of how various "players" should share in the costs and benefits of an economically desirable activity. By way of illustration, consider the following example. Four towns are contemplating whether to invest in a common municipal water supply. Suppose each town could supply its own water with a small system at $10.00 per family per month. There are, however, economies of scale in water systems, and the cost falls to $9.00 if two towns combine systems, to $8.50 if three towns combine, and to $8.00 if all four

towns agree to build a common system. The efficient solution is of course to build the common system, but there are a range of prices over which the towns could negotiate. All four towns could be charged $8.00, although charging one town $7.75 and another $8.25 is also a possible solution. In theory, so long as a town paid less than $10.00 a month it would be better off than if it built its own system. In addition, each town could negotiate with others, so that, for example, no two towns could be charged more than an average of $9.00 per family, etc. Thus, there are a range of prices under which it makes sense to build the common system. The towns would negotiate among themselves to determine each town's share of the costs.

Even though in principle a broad range of prices might be feasible solutions to the bargaining among the four towns, some results are fairer than others, and some are also more likely to be the result of an actual real-world negotiation than others. In my example, if all four towns are similarly situated, have the same number of citizens, and so on, the fairest result, and the result that most likely would occur in a real negotiation, would be that all four towns would join, and each town would pay $8.00. In a more complex hypothetical, there might be reasons why it would be fair for one town to pay less than another. For example, one town might be larger, and therefore contribute more to realizing the benefits of economies of scale.

2. The Shapley Solution

In the market at issue in this proceeding, the SDARS and all of their content providers can join together and create a profitable business generating a surplus. The question is how to divide that surplus. Here, I apply the approach of using the "Shapley" solution to the cooperative game. The Shapley solution, which is named after its creator, develops a fair solution in situations that are more complicated than the hypothetical I set out in the preceding section. The Shapley solution is the most widely used model for allocating benefits in this manner and is

widely endorsed by economists.[19] Shapley's theorem operates from four intuitive and uncontroversial axioms, which depend on concepts of fairness and efficiency.[20] Given those axioms, the Shapley theorem says that there is a unique set of prices or payoffs that is a solution to the cooperative game. This unique solution, termed the Shapley value, is the computational result of averaging the value of each player's incremental contribution to all possible coalitions. In Appendix II, I provide a more detailed intuitive explanation of the operation of the Shapley solution to a cooperative game.

The Shapley value does not give any particular player any bargaining advantage over the others, because it averages situations where each player is at a bargaining advantage and a bargaining disadvantage.[21] For that reason, among others, the Shapley value is widely recognized by economists as having a strong normative claim to being the best and "fairest" solution to a cooperative game. It is used by economists to calculate the division of economic

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[19] *See, e.g.* New Palgrave Dictionary of Economics at 211 ("In view of both its strong intuitive appeal and its mathematical tractability, the Shapley value has been the focus of much research and applications."), http://www.ma.huji.ac.il/~hart/abs/val-palg.html.

[20] These axioms are i) *symmetry* or equal treatment -- two players have equal value if when one is substituted for the other in a coalition and the coalition's payoff doesn't change, then each player receives the same value, ii) *null or dummy player* -- a player who adds zero value to a coalition receives a zero payoff, iii) *efficiency or Pareto optimality* -- the sum of the values assigned to all players equals the maximal amount the players can jointly get, and iv) *additivity* -- the notion that each player must not detract from the value of the whole. The lowest value a player can add to a coalition is zero. *See* Sergiu Hart, "Shapley Value" *in The New Palgrave Game Theory* (Eatwell, Milgrave and Newman, eds., The Macmillan Press 1989). Shapley's value axioms can be interpreted as rules for "fair" division, guiding an impartial "referee" or "arbitrator" (p. 211).

[21] For example, in one coalition, a satellite radio company may be added before a record label. Then the record label would get a large payoff because its incremental contribution to the service is very large – the service has no value without sound recordings. But in another coalition, the record label is added first, and the satellite radio company has a large incremental value because it is also essential, and the service has no value until *it* is added. The Shapley value is derived from the average of these and all other possible coalitions.

surplus, just as I am using it here.[22] The Shapley value offers an excellent match to the governing statutory factors. It is based on concepts of fairness so it captures the policy of the second factor. Because the surplus analysis in general, and the Shapley solution to the cooperative game in particular, are meant to represent results that would be observed in the marketplace, this approach also captures the first and third statutory factors. Also, the surplus calculation is based on the SDARS' profit in excess of its costs, including a risk-adjusted return on capital investment.

3. Inputs to the Model

The results of the Shapley division of the SDARS' surplus are of course dependent upon the inputs entered into the model. It is important to understand, however, that the sensitivity of the model results to any particular input can be tested by changing the input slightly and re-running the model. This is a critical safeguard: selecting input values calls for judgments, and responsible analysis requires an understanding of those inputs that have a greater or lesser effect on the end result. I ran the Shapley model with many input variations to determine the factors and judgment most important to the results. All of these model runs are available to parties in this proceeding so that they may better understand the workings of the model. By running the model many times with many different sets of inputs, I have an understanding of the inputs that are most important.

In particular, there are four sets of modeling choices I made that merit discussion.

First, I established the number of "players" in the game. Although, as I just indicated, I ran the model with many different combinations of players, the model result I relied upon involves 15 players: two SDARS, four major record labels, three additional "independent" record

[22] *See* Oliver Hart, John Moore, "Property Rights and the Nature of the Firm," 98 Journal of Political Economy 1119, 1151 (1990); New Palgrave Dictionary of Economics at 213.

labels, two providers of "talk" radio, two providers of "sports" radio, and two providers of "news" radio.

The rationale for the first two of these choices is self-evident. I selected two SDARS and four major record companies because that reflects the reality of the market today. Each of the four major record companies, as well as the many smaller ones, is assumed to sell blanket licenses to all the copyrighted sound recordings in its portfolio.

Because the model requires substantial computing power, it is not possible practically to build a model that includes individually each of the scores of additional different content providers that actually appear on the SDARS. Instead, in the model runs upon which I rely, I included several representatives of each of the major forms of content provided by the SDARS. I did many "runs" with different numbers of independent record labels, talk show content and so on, and the results do not greatly vary depending on whether there are more or less of these additional content providers. Instead, the more important consideration is the value I assign to each category of service, which I address immediately below.

Second, I assigned values to each of the "players" based on the number of customers each type of programming brings to the SDARS service. In making this calculation, I used the results of Dr. Wind's survey. That survey determined the incremental revenues added by each type of programming, assuming that the other types of programming already were offered. That information fits perfectly with the way value is added in the Shapley model, so I can apply the results of the survey directly in assigning each player its relative value. The incremental revenue determined by the survey, stated as a percentage of total revenues when all four program types

were offered, are 53.3% for sound recordings, 22.6% for news, 23.3% for sports, and 23.4% for talk/entertainment programming.[23]

Within each program category, shares are distributed among the players unevenly. For talk, sports, and news programming, I assumed one larger player and one smaller one. While each of these choices is reasonable, the use of different share assumptions within these program types has no significant effect on the Shapley values.

I report Shapley values under two different assumptions about the relative size of the record labels. In one case, the first four labels are given sound recordings shares matching the U.S. shares of the four major record labels, and three small labels are given shares that divide equally the current market share of the independent record companies. In the alternate simulation, I assume that the seven record labels have equal shares. I am primarily interested in the total implied royalty for sound recordings, and the equal share run allows me to disentangle the effects of sound recordings overall being essential content even when no particular label is essential, from cases where an individual label may be essential.[24]

Third, I assume that unless content representing 50% of the total value, as calculated above, is present, the game "fails," *i.e.*, the value of the game is zero. In other words, I assume that the SDARS need at least 50% of the content they currently have before they have enough content to sell a product to customers that will generate enough revenue to justify the costs involved in operating an SDARS business.

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[23] I normalize these relative values to assign content shares for the various players so that the total value when all players participate is equal to 100%.

[24] For example, in the runs where the minimal product must contain at least 75% of the sound recordings, a label with a 30% share would be essential, but smaller labels would not be essential.

An important feature that results from the way that I assigned value is that sound recordings become essential content for the SDARS, but no other type of programming is essential. This result is fully corroborated by the Wind survey. This survey indicates that satellite radio would lose at least 53% of its subscriber revenue if the service offered no sound recordings. The same survey indicated that when talk/entertainment, sports, and news are dropped from satellite radio programming, the foregone revenues were in the range of 23% each. A satellite radio industry that lost over 50% of its revenue would not be profitable, while the industry could still be profitable with revenues reduced by 23%.[25]

Finally, I assume that a viable product must offer at least 75% of available sound recordings. This assumption is consistent with licensing patterns in channels, such as interactive webcasting, where licensors choose to broadly license sound recordings, rather than restrict themselves to a subset of labels. Licensors could attempt to elicit lower bids from each of the labels by threatening to license from only the two labels that offered the lowest royalty rates. As a factual matter, this does not happen. The reason it does not happen is that any licensor that so limited the sound recordings it offered would be at a significant competitive disadvantage compared to rivals who licensed more broadly. Based on my understanding of the marketplace, I believe this 75% assumption to be conservative. A more realistic assumption that 90% of sound recordings are required would result in a larger share for the copyright owners.

4. Model Results

The table below shows the sound recording copyright holders' collective Shapley share of the surplus generated by SDARS. The table shows the results with the assumptions I

[25] Looking at 2012, Sirius and XM are each expected to have about 20 million subscribers. Losing sound recordings would reduce subscribers to about 9 million. *See supra* n.14 (56% of subscribers lost). The satellite companies would not have launched if their business only approached 9 million subscribers in 2012, and was lower than that in earlier years.

ultimately relied upon: the SDARS require at least 50% of all content in order to operate a successful service, the SDARS need at least 75% of all sound recordings to operate a successful service, the record companies have the unequal size that they have in the real world, and the second SDARS adds 5% to the total value of the game through product differentiation. The table also shows the extent to which the ultimate results change if any of these assumptions are varied, for example, if one assumes 60% of all content is required, or 90% of all music is required, or if the record companies were all the same size.

SOUNDEXCHANGE'S TOTAL SHAPLEY SHARE

	Minimum Percent of Sound Recording Content Required	**Minimum Percent of Content Required**	
		50%	**60%**
		Shapley value for Share captured by sound recording rights holders	
Real World Record Company Size	**65%**	52%	47%
	75%	62%	57%
	90%	73%	68%
All Record Companies the Same Size	**65%**	52%	47%
	75%	66%	60%
	90%	83%	79%

The first three rows represent the results of computer model runs establishing sound recordings rights holders' fair and expected share of the surplus when the four major record labels are assigned their actual industry share of all sound recordings. The last three rows represent the same computer runs when the record companies are assumed to be of the same size. These results dispel claims that sound recording copyright holders are getting some unfair advantage because of their size. As the results indicate, the opposite is true: the sound recording

copyright holders' share actually *increases* when the major record labels are treated as being the same size.

The rows in the chart then represent the results of computer runs based on assumptions that the SDARS need 65%, 75%, or 90% of all sound recordings in order to operate a successful service. As the chart describes, the share allocated to sound recording rights holders in the model increases as these percentages rise.

Finally, the two columns represent two different assumptions about how much of the total available content (both music and non-music) is necessary to operate a successful SDARS. The chart shows, as one would expect, that the more total content is required for the SDARS to be viable (which results in more non-music content being required), the smaller the share of the surplus sound recording rights holders obtain.

The Shapley results are remarkably consistent, regardless of which assumptions are used. Sound recording rights holders' collective share is generally 60% or higher if 75% or more of sound recordings is required for a viable SDARS. Sound recording rights holders' share falls below that level if one assumes that an SDARS could profitably operate with only 65% percent of the music available under the blanket license. I am not aware of any claim in this or in any other proceeding that a music broadcast medium could survive with such a limited choice of music. Moreover, as I just indicated, this conclusion does not derive from the major labels' disproportionately large market shares. Indeed, sound recording rights holders' collective Shapley share increases when this share is divided evenly among the labels.

The Shapley model results reflect the percentage of the overall surplus that each content provider and the SDARS would receive. The results show that the SDARS themselves would receive approximately 10% of the additional surplus (over and above the return on capital

discussed above). Because, however, consumers so value sound recordings as indispensable content of the SDARS service, sound recording copyright holders would obtain the majority of the available surplus. The model demonstrates that a fair result that I would expect to see replicated in the marketplace is that the sound recording rights holders would obtain 62% of any surplus created by the SDARS in 2012.[26]

C. Derivation of License Fee Based on the Surplus Model for 2012

As I described in the previous section, the surplus to be divided among the SDARS and all content providers in 2012 will be $4.67 per subscriber per month. I would expect sound recording rights holders to obtain approximately 62% of that surplus. That yields a per subscriber rate of $2.90 per subscriber per month ($4.67 x 62%). Stated as a percent of revenue, sound recording rights holders would receive 24% of revenue.[27] I believe that a marketplace negotiation would yield rates at this approximate level for the year 2012.

D. Analysis of License Fees for 2007-2011

As stated above, the rates derived by applying the Shapley result to the $4.67 surplus rely on 2012 surplus figures. SoundExchange structured its rate proposal to start at a much lower rate, ratcheting up in 2012 to a level that is similar to the results indicated for that year by the Shapley model. I agree with SoundExchange's judgment to lower the rate proposal in the early years of the statutory license. The fourth statutory factor requires the Court to consider disruption to the structures of the industries involved, and that must be taken into account in structuring rates over the course of the statutory license.

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[26] *See* Appendix III for a detailed table showing the Shapley values of each content provider and SDARS.

[27] This percentage is obtained by deflating 2012 ARPU to 2007 dollars, yielding revenue per user of $11.99. $2.90 divided by $11.99 is 24%.

In this section, I consider the reasonableness of the rates in the early years of the statutory license. I understand that Mr. Butson concluded that, if adopted, SoundExchange's rate proposal will not affect the SDARS' liquidity at any point during the statutory license to the extent that it will require the SDARS to raise additional funds from the stock or bond markets.

It is difficult to assess the fairness or reasonableness of a rate when applied to companies in periods of rapid growth, such as the SDARS in 2007. In such periods, companies are investing substantial resources to build up their customer base. These costs are incurred based on the reasonable assumption that they will be offset in the future with commensurate revenues. A surplus analysis, which by its nature is a snapshot of a business at a particular point in time, is of only limited use in assessing the economic situation of a business in such a period of rapid growth. The investment in future growth and revenue, combined with the inherently static nature of the surplus analysis, almost inevitably creates a misleading financial picture. Unlike a more mature business in a stable state, in which a snapshot of one year will capture both the costs of the business and the revenue those costs generate, a snapshot of a business in its early years captures the costs, but not the revenues that are the expected result of those costs.

Suppliers of inputs to the business therefore do not rely on the surplus they find in the pro forma profit and loss statements when they bargain with businesses in such a period of high growth. A business might be spending all of its money to attract new customers, and have no surplus at all. An input supplier would not give its product away for free in such a situation, because it understands that the surplus to which it is contributing will only develop in later years. It would demand its share of *that* anticipated surplus. That is why the surplus generated in the later years of the statutory license, when the SDARS are in more of a steady state in which

annual costs are generating annual revenues during the same calendar year, are a much more reliable basis on which to negotiate a rate.

This analysis is corroborated by the analysis of content deals that the SDARS themselves struck that I performed earlier in this report. Howard Stern received benefits that are not justified by looking only at Sirius's revenue and its costs in 2006, a time when its costs were greater than its revenues. The surplus that Howard Stern was recovering was not 2006 surplus, but surplus that Sirius expected to be generating as a result of Stern's content in future years. And, it is highly instructive that the amounts Howard Stern received in his deal struck in 2005 resemble the results of the surplus analysis I just performed for 2012, and not the results of a similar analysis were it performed in 2005, at a time when Sirius had a negative surplus.

I further checked on SoundExchange's rate proposal in the earlier years by performing a different kind of analysis that attempts to approximate a hypothetical "steady state" for the SDARS in the early years, as if they were not investing substantial resources in future growth. In that analysis, I assumed that the costs incurred by the SDARS in one year would include only those costs necessary to maintain the steady state. I describe the details of that analysis in Appendix IV to this Report. The analysis confirms the fairness of SoundExchange's approach, which gives SoundExchange its appropriate share, based on the Shapley model, of the "steady state" surplus during the early years of the license.

VI. SDARS RATE PROPOSAL

SoundExchange has proposed that the SDARS royalty rates be based on the greater of (1) revenue received by the SDARS, or (2) a per subscriber per month charge. SoundExchange's proposed rates start at 10% of revenue or $1.10 per subscriber per month, and rise to a level of 23% of revenue or $2.75 per subscriber per month in the last year of the statutory license.

The 23% of revenue/$2.75 per subscriber per month charge proposed during the last year of the license fully satisfies the statutory criteria. The rate is substantially similar to the rate derived both from my analysis of the Howard Stern contract, and from my analysis of the SDARS' revenue and cost data, which relied on the Shapley results. It is also within the range of rates identified in Dr. Ordover's analysis relating to other sound recordings royalty arrangements negotiated in the open market. I believe it is highly instructive that all three of these quite different analyses yielded rates in the same range.

SoundExchange proposes to phase these rates in over time in order to satisfy the fourth statutory factor and not to disrupt the structure of the industries involved. A rate as low as the highly-subsidized rate proposed in the first year of the license, carried forward throughout the statutory period, would risk considerable disruption to the sound recordings industry as it shifts to digital distribution of its products. On the other hand, the $2.75/23% rate proposed for the last year of the period is a substantial increase from current rates, and because the SDARS have not yet achieved the scale they will surely achieve over the course of the license period, imposing such a rate immediately arguably could be disruptive to the SDARS. SoundExchange's decision to increase the rate over time seems a reasonable way to address these competing concerns.

VII. PRICING OF PES SERVICES

I have analyzed SoundExchange's proposed license fee for preexisting subscription services other than the SDARS ("PES") based on the methodology I used to develop a rate proposal for non-interactive webcasting, which I recommended to the Copyright Royalty Board in Docket No. 2005-1 CRB DTRA (the "webcasting proceeding").[28] I believe this is a reasonable approach, because the subscription webcasting services and these cable-based digital audio PES

[28] I understand my testimony in that proceeding will be incorporated by reference into this proceeding.

services are comparable in a variety of ways. The underlying value of both types of services to the listeners is, in many respects, similar. Each provides generally commercial-free sound recordings that are, in most circumstances, received over a television or computer (*e.g.*, they are not portable). This means that the buyers and sellers of the sound recordings used in these services would be likely to reach agreement on a fee that was comparable, absent a compulsory license. Furthermore, to the extent there is a difference in customer listening patterns on the types of services, it is possible to make a relatively straightforward adjustment to estimate these differences. I propose such an adjustment in my testimony.

A. Comparability of Cable-Based Digital Music Services and Webcasting Services

The PES provide dozens of channels of CD-quality digital music that are sold to cable television systems and then provided to customers as part of a premium package of "digital" services. The sound recordings service provided to cable TV customers is similar to the services offered by many webcasters -- they both offer a wide variety of high quality digital commercial free music. Indeed, Music Choice offers service over the web and pays the royalties to SoundExchange for those services as a webcaster, and offers a similar service to certain cable television systems.

The similarity of the statutory subscription webcasting services and these cable-based subscription services stems in part from the statutory requirements pertaining to listener interactivity and to various limitations on the frequency of plays by a single artist or on a single album. From the listener's standpoint, the two services provide a similar experience, the key features of which include (a) multi-channel, high quality, commercial-free sound recordings, and (b) an inability to select individual songs, replay, or pause sound recordings. Also, both subscription webcasting and PES subscription services are commonly provided on non-portable

equipment, used primarily for other purposes than playing sound recordings, *i.e.*, the home computer and the cable box connected to a television set.[29] Further, in both cases, consumers who want a higher-fidelity sound from these respective services can connect their computer, or their television set, to a home entertainment system and enjoy near CD-quality sound recordings over more sophisticated audio equipment.

In light of these similarities, I recommend adopting the same level of fees (adjusted for differences in usage) for both webcasting and cable-based services. There are three reasons for this.

First, some listeners are likely to view these services as close substitutes. Therefore, if the usage-adjusted prices charged by the record companies to the suppliers of both services are different, this will lead to a distortion in the relative market prices to listeners, and an artificial advantage being given to one delivery mechanism over the other. This would be economically wasteful and could disadvantage listeners, sound recordings service providers, and copyright holders alike.

Second, even if the two markets are viewed in isolation, the customers' listening experience will be quite similar in both markets, and therefore their willingness to pay for the sound recordings content should be similar. A copyright holder is likely to set similar prices (in proportion to usage) in two markets where the customers' willingness to pay is similar.

Third, the rate here in the last year of the statutory license is the same as the rate I propose for the new subscription services that sound recordings services offer over satellite

[29] In proposing a separate rate for wireless webcasting, I noted the increased value of such services to consumers and the increased fee that would be required. I have assumed for purposes of this analysis that television-based services will remain tethered to non-portable devices for the period of this license. To the extent that ceases to be true, a different -- and higher -- rate would be appropriate.

television systems. I can think of no reason why rates for such virtually identical services should be different as an economic matter, and it would distort the market if they were.

B. Recommended Rate for Cable-Based Digital Music Services

In the webcasting proceeding, I recommended a three-part rate structure, whereby non-interactive webcasting services would pay the greater of: (1) $1.37 per month per subscriber; (2) 30% of revenue derived from the sound recordings service; and (3) 0.197¢ per play. I derived the level and structure of these rates from an analysis of the rates freely agreed to by the webcasters and the record companies in the market for interactive music services. I adjusted the rates in this benchmark market to account for the lower relative value to consumers of a non-interactive music service. In my opinion, this rate structure and rate level reflects accurately the demand and supply considerations of a free market for non-interactive webcasting services.

My recommendation in the webcasting proceeding was based fundamentally on my analysis of the per-subscriber rate in the interactive market. I used basic economic principles to demonstrate the relationship that would exist in a free market between copyright fees and retail prices, when both were stated on a per-subscriber basis. I then developed a recommended per-subscriber fee for non-interactive webcasting based on my estimate of the retail price that would be charged for a statutory webcasting service in a free market. Finally, I derived the other two components of the rate structure (*i.e.*, the percentage of retail revenue and the per play fee) from data on fees, revenues, and number of plays in the non-interactive webcasting market.

1. PES Rate Structure

As I noted in my testimony in the webcasting proceeding, the marketplace evidence for a "greater of" rate structure for digital sound recordings services is overwhelming. In virtually every contract with interactive webcasters, record companies receive a royalty fee payment equal to the greater of a percentage of the digital sound recordings services' revenue or a per subscriber

and/or per performance minimum fee. I see no reason not to adopt a similar approach here. The same principles that applied to webcasting apply here.

In this case, however, it is more difficult to observe any of the three alternative measures of underlying consumer demand for the sound recordings provided by the television-based digital services. Unlike Internet-based services, here it is not possible to measure the number of times a copyrighted work is played, so a "per play" rate is impractical. In addition, consumers do not purchase the music service separately, so there is no published per-subscriber charge upon which to base the copyright fee.

Moreover, it is difficult to determine a meaningful measure of revenue upon which to base a percentage-of-revenue fee. Because the current royalty rates are so low, this necessarily has suppressed the rates charged by the PES to the cable television providers. Therefore, a license fee based on current prices paid to the PES providers would not reflect the actual value placed on the sound recordings in the marketplace, because the rates charged to the cable companies by the PES providers are based in part on the copyright fee that the PES must pay to the copyright holder. That fee, however, is set through regulation, and not in the marketplace. Thus, even if the PES demanded the full value for their services from cable television providers in direct payments, that figure would not accurately reflect the true marketplace value of the copyright itself.

2. Calculating the Percentage of Revenue Rate

For the percentage of revenue, for the final year of the statutory license SoundExchange legitimately has proposed the same percentage that I derived from the webcasting proceeding: 30% of revenue.

3. Calculating Per Subscriber Rate

As noted above, it is difficult, if not impossible, to calculate a per performance rate for PES services, but it is possible to derive a relevant per subscriber rate based on the fee I recommended in the webcasting proceeding. SoundExchange has based its proposal on just such a derived rate. Just as subscribers to webcasting services pay a certain amount for the sound recordings they listen to on webcasting services, so too subscribers to the television-based services effectively pay some portion of their subscription fees to listen to sound recordings through their cable television. Given comparable services that may substitute for each other, the record companies in the marketplace likely would seek similar amounts for the same amount of music listening.

A reasonable proxy for this amount can be derived by comparing subscribers' listening patterns on television-based services to the subscribers' listening patterns on subscription webcasting services. The time spent listening to the services serves as a fair measure of the value customers attach to the respective services. By this method, I can calculate a rate that ensures that copyright owners receive the same amount for an hour of their sound recordings that is listened to on a webcast, as they do for an hour of their sound recordings that is listened to on cable television.

Accordingly, I propose to compare the time spent listening to the PES services by a digital cable subscriber, to the time spent listening to music by a webcasting subscriber. I then calculate a per-subscriber fee for the television-based services by multiplying the rate I recommended for statutory webcasting ($1.37/month) by this ratio of time spent listening.[30] I

[30] I am assuming that it will be possible to determine the number of subscribers to the digital tier of services of cable TV companies either from the PES or from public reports of the cable TV companies themselves.

believe the economic logic underlying my rate proposal in the webcasting proceeding supports this method for setting a copyright fee for the television-based services.

A recent survey conducted by Zoomerang on behalf of SoundExchange collected information on cable subscribers' listening patterns. Zoomerang sent the survey to individuals whom it had identified as having subscribed to a digital tier of a cable television service. After asking whether those individuals currently subscribed to such a service, the survey polled for the amount of time they spend listening to the PES music channels on their digital cable systems. (Individuals who responded that they did not currently subscribe to a digital tier of a cable service were not asked the second question.) There were no other questions on the survey, and the responses to the relevant second question are reported in the table below:

No Music Service	42
0 Hours/week	206
0-2 Hours/week	190
2-4 Hours/week	88
4-6 Hours/week	37
6-10 Hours/week	28
10-20 Hours/week	15
More than 20 Hours/week	17
Total	623

In order to aggregate these responses it is necessary to make assumptions about what point estimate to use for responses given within a range of listening time, and also how to treat customers who say they do not receive a music service. This response could indicate the cable

companies' services do not include music. Alternatively, it could indicate that the customer has not become aware of the music service. To err on the side of estimating a lower fee, I have used the latter assumption.

I estimated the average time spent listening using two different sets of assumption about the average time spent listening by subscribers in each range of weekly listening time. The "low-end" results are obtained by using the low end in each range of hours (for example, zero, where the range is zero to two). The "mid-point" results are obtained by using the mid-point of each range of hours (for example, one, where the range is zero to two), and twenty-five hours for the above twenty hour range. The results are given in the table below.

Average Weekly Listening Time

Low-End	1.6
Mid-Point	2.4

To develop my recommended rate, I use the midpoint between the low-end and mid-point calculations and assume average listening per customer of two hours per week. I also assume four weeks per month (rather than an actual conversion of 4.33 weeks per month), which yields a conservative estimate of eight hours per month of listening per subscriber.

The next step is to calculate the ratio of time spent listening to television-based sound recordings service programming to the time spent listening to a subscription webcasting service. In my testimony in the webcasting proceeding, I based my recommended per-play rate on a measure of usage at 45 hours per month, based on public statements of webcasters and information about listening patterns. In order to maintain consistency between the rates in the two cases, I will use 45 hours per month as the basis for developing my recommendation in this

proceeding. Therefore, the ratio of television-based music listening to webcasting sound recordings listening is 8-to-45, which is approximately 0.18.

The final step I take is to multiply my recommended rate in the webcasting proceeding of $1.37 per subscriber month by the listening ratio of 0.18. This yields a rate for the television-based digital sound recordings services of 25¢ per subscriber per month. This rate would be applied on a monthly basis counting all subscribers to the digital tier of cable television services.

C. Rate Structure Issues

The fourth statutory factor requires the court to consider whether the rate it adopts will lead to disruption to the structure of the industries involved. I am aware that the rate I am proposing for the PES is a substantial increase over the existing rate, which provides little compensation for the sound recording content provided. In a free market, this highly subsidized rate would not be tolerated and sound recording copyright holders would demand immediate payment of market rates from the PES. However, in light of the fourth statutory criteria, I recommend instead that the new rate be phased in over the statutory period, starting at a highly subsidized rate of the greater of $.15/subscriber/month or 5% of revenue.

I declare under penalty of perjury that the foregoing testimony is true and correct to the best of my knowledge and belief.

Date: 10/27/06

Michael Pelcovits

APPENDIX I

MiCRA *Microeconomic Consulting & Research Associates, Inc.*

MICHAEL D. PELCOVITS

PRINCIPAL
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CURRICULUM VITÆ

(October 2006)

EDUCATION

Massachusetts Institute of Technology, Ph.D. (Economics), 1976
University of Rochester, B.A. (Economics), *summa cum laude,* 1972

EMPLOYMENT

MiCRA
Principal: October 2002 – Present

MCI Communications (WorldCom, subsequent to its acquisition of MCI)
Vice President and Chief Economist: 1998 - 2002
Executive Director: 1996 – 1998
Director: 1992 – 1996
Senior Policy Adviser: 1988 – 1992

Cornell, Pelcovits & Brenner Economists Inc
Vice President and Treasurer: 1982 – 1988

Owen, Cornell, Greenhalgh & Myslinski Economists Inc.
Senior Economist: 1981 – 1982

Federal Communications Commission, Office of Plans and Policy
Senior Economist: 1979 – 1981

Civil Aeronautics Board, Bureau of International Aviation
Industry Economist: 1978 – 1979

University of Maryland, College Park, Department of Economics
Assistant Professor: 1976 – 1978

ACADEMIC AWARDS

National Science Foundation Graduate Fellowship, 1972 – 1975
Phi Beta Kappa, 1972
Isaac Sherman Graduate Fellowship, 1972 (University of Rochester)
John Dows Mairs Prize in Economics, 1971 (University of Rochester)

PUBLICATIONS

"Long Distance Telecommunications" in Diana L. Moss, editor, Network Access, Regulation and Antitrust, (Routledge), 2005.

"The WorldCom-Sprint Merger" in John Kwoka, Jr. and Lawrence J. White, editors, The Antitrust Revolution, The Role of Economics, 4th Edition (Oxford University Press), 2003.

"Economics of the Internet," (with Vinton Cerf), in Gary Madden and Scott Savage, editors, The International Handbook On Emerging Telecommunications Networks (Edward Elgar), 2003.

"Application of Real Options Theory to TELRIC Models: Real Trouble or Red Herring" in James Alleman and Eli Noam, editors, The New Investment Theory of Real Options and its Implications for Telecommunications Economics, (The Netherlands, Kluwer Academic Publishers, 1999).

"The Promise of Internet Access over Cable TV: Should the government force open access requirements?" (with Richard Whitt), CCH Power and Telecom Law, Vol. 2, No. 7, November/December 1999.

"Toward Competition in Phone Service: A Legacy of Regulatory Failure," (with Nina W. Cornell and Steven R. Brenner), Regulation, July/August 1983.

"Access Charges, Costs, and Subsidies: The Effect of Long Distance Competition on Local Rates," (with Nina W. Cornell), in Eli Noam, editor, Telecommunications Regulation Today and Tomorrow, (New York: Harcourt Brace Jovanovich, 1983).

"The Equivalence of Quotas and Buffer Stocks as Alternative Stabilization Policies," Journal of International Economics, May 1979.

"Revised Estimates U.S. Tax Revenue (with Jagdish Bhagwati), in Bhagwati and Partington editors, Taxing the Brain Drain, (North Holland, 1976).

"Quotas Versus Tariffs," Journal of International Economics, November, 1976.

OTHER PROFESSIONAL ACTIVITIES

Speaker and Panelist (selected examples):

Advanced Workshop in Regulation and Competition, Center for Research in Regulated Industries, Rutgers Business School, "Open Access Policies, Net Neutrality and Incentives for Innovation in the Telecommunications," June 29, 2006

National Association of State Utility Consumer Advocates, "Telco Structural Separations, Costs & Benefits," June 19, 2001

LeBoeuf, Lamb, Greene & MacRae, "Telecom Restructuring: The Road to Profitability -- Is there a Map?" June 11, 2001

Columbia University, Graduate School of Business, Institute for Tele-Information, "European Lessons in Liberalization: The German Experience in Telecommunications & Internet Applications," February 16, 1999

Massachusetts Institute of Technology, "Economics of the Internet: Lessons from Regulation of Telephony," April 30, 1998

National Association of State Utility Consumer Advocates, "The Telecommunications Act Two Years Later," February 10, 1998

Columbia University, Graduate School of Business, Institute for Tele-Information, "From the Blueprint to Reality: A Look Into the Second Year of the Telecommunications Act of 1996," April 10, 1997

Federal Communications Commission, Federal State Joint Board on Separations, February 26, 1997

Alliance for Public Technology, "Technologies of Freedom: Linking the Home to the Highway," February 21, 1997

Federal Communications Commission, Federal-State Joint Board on Universal Service, June 5, 1996

Columbia University, Graduate School of Business, Institute for Tele-Information, "Telecommunications Act of 1996: The Morning After," February 6, 1996

New York Law School, Communications Media Center, "Universal Service in Context: A Multidisciplinary Perspective," December 6, 1995

Kansas University, "Stakeholders Symposium on Telecommunications," November 2, 1995

Guest lecturer in graduate and undergraduate courses at:

Columbia University, Graduate School of Business
New York University, Stern School of Business
Georgetown University, McDonnough School of Business
George Washington University
Johns Hopkins University
University of Maryland
American University
Northeastern University

RECENT TESTIMONIES (2003 to present)

U.S. DISTRICT COURT

In The United States District Court for The District of Colorado, Civil Action No. 03-F-2084 (CBS), QWEST CORPORATION, Plaintiff, v. AT&T CORP, Defendant. (Deposition taken; case settled)

LONDON COURT OF INTERNATIONAL ARBITRATION

In the Matter of an Arbitration Between: France Mobile Telecom Mobile Satellite SA, Stratos Wireless Inc, Telenor Satellite Services AS Claimants - and – Inmarsat Global Limited Respondents, LCIA Arbitrations No. 6767, 6768, and 6769.

COPYRIGHT ROYALTY BOARD

In the Matter of Digital Performance Right in Sound Recordings and Ephemeral Records, Docket No. 2005-1 CRB DTRA.

STATE UTILITY COMMISSIONS

State of Connecticut, Department of Public Utility Control, DPUC Investigation of Intrastate Access Charges, Docket No. 02-05-17.

State of Connecticut, Department of Public Utility Control, Application of Southern New England Telephone Company for Approval to Reclassify Certain Private Line Services from Noncompetitive to Competitive Category, Docket No. 03-02-17.

Pennsylvania Public Utility Commission, AT&T Communications of Pennsylvania, Inc. v. Verizon North, Inc. Docket Number C-20027195.

Pennsylvania Public Utility Commission, Investigation into the Obligations of Incumbent Local Exchange Carriers to Unbundle Network Elements, Docket No. I-00030099.

Pennsylvania Public Utility Commission, Generic Investigation in re: Impact On Local Carrier Compensation if A Competitive Local Exchange Carrier Defines Local Calling Areas Differently Than the Incumbent Local Exchange Carrier's Local Calling Areas but Consistent With Established Commission Precedent, Docket No. I - 00030096.

Pennsylvania Public Utility Commission v. Verizon Pennsylvania Inc. Tariff No. 216 Revisions Regarding Four Line Carve Out, Docket No. R – 00049524; Pennsylvania Public Utility Commission v. Verizon Pennsylvania Tariff No. 216 Revisions Regarding Switching, Transport and Platform for High Capacity Loop, Docket No. R – 00049525.

RECENT FCC DECLARATIONS

In the Matter of Amendments of Parts 1, 21, 73, and 101 of The Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands, WT Docket No. 03-66

In the Matter of Tyco Telecommunications, VSNL Telecommunications, et al, Application for Transfer of Control of Cable Landing Licenses, Petition to Deny of Crest Communications Corporation

In the Matter of Review of the Commission's Rule Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers

In the Matter of AT&T Corp. Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services

In the Matter of Unbundled Access to Network Elements, Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers

In the Matter of Appropriate Framework for Broadband Access to the Internet over Wireline Facilities

Center for Communications Management Information, Econobill Corporation, and On Line Marketing, Inc., Complainants, v. AT&T Corporation, Defendant

RECENT CONSULTING ASSIGNMENTS

Telecommunications Industry

Prepared FCC declaration for the Wireless Communications Association International analyzing the impact of limits on spectrum leases in the Educational Broadcasting Service bands on investment in wireless infrastructure

Prepared expert reports for the Infocomm Development Authority of Singapore on access to submarine cable landing stations and regulation of local leased line circuits

Prepared and presented an analysis of the market for termination of calling on mobile phones to Ofcom, the independent regulator and competition authority for the UK communications industries

Hired to provide expert analysis of liability and damage issues in Civil Action No. 5:03-CV-229: *Z-Tel Communications Inc.* v. *SBC Communications Inc. et al;* In the United States District Court for the Eastern District of Texas, Texarkana Division (case settled)

Other Industries

Analyzed the market for Internet music services and recommended a rate for the compulsory license fee for digital audio transmission of sound recordings.

Hired by a rural electric power company to develop a damage model for a case involving the failure of a lessee to properly maintain and utilize a coal-powered electric power plant (case settled)

Analysis of economic benefits and tax revenues from the construction and operations of a hotel and villa complex in the British Virgin Islands

APPENDIX II -- EXPLANATION OF THE SHAPLEY SOLUTION

I. THE MECHANICS OF A SHAPLEY MODEL ANALYSIS

Like many well-accepted economic theories, the proof and mathematical justification for the Shapley model is highly complex. The proof itself can be found in Lloyd S. Shapley, "A Value for *n*-Person Games" *in The Shapley Value: Essays in Honor of Lloyd S. Shapley* 31-41(Alvin E. Roth ed., 1988).

While the Shapley proof is complex, the actual mechanical operation of the model is not overly complicated, though it requires substantial computing power whenever the problem presented has more than a trivial number of solutions. In what follows, I will present a very simple Shapley model that divides up a surplus generated by a hypothetical SDARS, in order to illustrate how the model works. Unlike the model I actually use in my testimony, for simplicity's sake I will exclude the SDARS themselves from this model, and I will limit the content providers to three players: one seller each of music, talk, and sports programming.

I make the following additional assumptions. First, I assume that the various program sources attract customers as follows:

Music = 60 customers

Talk = 25 customers

Sports = 15 customers

Further, I assume that each customer pays $1 per month. So if all three program types are offered, total revenues are $100 a month.

Next, I assume that the hypothetical SDARS' costs are $40/month. That means that the surplus available to be divided among the program types is $60/month ($100-$40).

The content providers will negotiate on whether to enter a joint venture to build the SDARS, and how to split the gains. It is clear that a wide range of payments will satisfy these constraints. Talk and sports cannot build a profitable SDARS either alone or with each other, so they will join the common SDARS for any payment greater than zero. For example, $20 to all three program types is a feasible solution, but so is $58 to music and $1 each to sports and talk. As such, there is a broad range of prices under which it would make sense for each program type to participate in the common SDARS.

In the Shapley solution each player's share of the total surplus ($60) is determined by calculating the incremental contribution each player brings to all possible combinations of programming, in all possible orders. Then each player's Shapley share of the surplus is given by the ratio of its average incremental contribution relative to the sum of average incremental contributions of all three program types.

To further explain what this means, I will next set out the Shapley solution described by these inputs, and then describe how the results are obtained.

Coalition	Total Value	Incremental Value Music	Incremental Value Sports	Incremental Value Talk
M (exclude S, T)	20	20	-	-
M (exclude T, S)	20	20		
S (exclude M, T)	0	-	0	-
S (exclude T, M)	0		0	
T (exclude M, S)	0	-	-	0
T (exclude S, M)	0			0
M+S	35	-	15	-
S+M	35	35	-	-
M+T	45	-	-	25
T+M	45	45	-	-
S+T	0	-	-	0
T+S	0	-	0	-
M+T+S	60	-	15	-
T+M+S	60	-	15	-
S+T+M	60	60	-	-
T+S+M	60	60	-	-
M+S+T	60	-	-	25
S+M+T	60	-	-	25

Music's average incremental value = 40 = (240/6)
Sport's average incremental value = 7.5 = (45/6)
Talk's average incremental value = 12.5 = (75/6)
Sum of incremental values = 60 = (40+7.5+12.5)

Music's Shapley value = 66.7% = (40/60)
Sport's Shapley value = 12.5% = (7.5/60)
Talk's Shapley value = 20.8% = (12.5/60)

Music's payoff = $40.00 = (66.7% x $60)
Sports payoff = $7.50 = (12.5 x $60)
Talk's payoff = $12.50 = (20.8% x $60)

The table above lays out the Shapley calculation. "M" stands for music. "S" stands for sports. "T" stands for talk. To describe the meaning of the figures in the five columns, I will refer to the entries corresponding to the seventh row from the top, where the first value listed under "Coalition" is "M+S." That row describes the following in each cell of the table:

The "Coalition" column represents every possible combination, in every possible order, of the game's three players. "M+S," in the seventh row, stands for an SDARS business that starts with music, and the values on the row that follow are designed to place a value that would be derived if sports joined a coalition that already contained music.

The "Total Value" column represents the total value of an SDARS' business that contains all members of the coalition identified in the relevant row. In the "M+S" row the "V" value is 35. That means that an SDARS business that contained both music and sports would generate a surplus of $35/month. That follows directly from my assumptions. Music brings 60 customers or $60/month. Sports brings 15 customers or $15/month. That means there is total revenue of $75/month, but the theoretical music/sports joint venture has to pay $40/month in costs to operate the SDARS. That leaves a total surplus value of $35/month from the combination of "M+S."

The "Incremental Value Music" column represents the incremental value music brings to the business when it is the last player to join the coalition. In the "M+S" row, music is the first player to the coalition, not the last player, so because of the order in which it joined the game, by definition it brings no *incremental* value to the game. As a result, there is no value listed in the "Incremental Value Music" column for the row "M+S."

The "Incremental Value Sports" column represents the incremental value sports brings to the business when it is the last player to join the coalition. In the "M+S" row, sports is the last player to join the coalition, and it does bring value. Sports brings an additional 15 customers, or $15/month, to what is already a profitable business providing only music. As such, the

"Incremental Value Sports" column in the "M+S" row, there is a value of 15, representing those added $15 sports has brought to the business.

Finally, the "Incremental Value Talk" column represents the incremental value talk brings to the SDARS business when it is the last player to join the coalition. In the "M+S" row, there is no talk content, so the "Incremental Value Talk" column is blank on this row.

To further explain the game, I will now describe how values are added to several of the other rows on the table. Starting with the first row, "M," that represents a game where music is the last player added to the coalition, but also the first (and only) player in the coalition. The value associated with a music only service is 20, because music adds $60/month of value to the service, and the service costs $40/month to operate, leaving a $20/month surplus. That same $20 appears in the "Incremental Value Music" column because when music was added to nothing as the last player in the game, it added $20 of value. Since no other content provider is involved in this version of the service, all of the other columns on the "M" row are blank. The Shapley solution treats the two possible ways in which the other two content providers would be added to the game with music as separate runs of the game.

The third and fouth rows describes what happens when sports is the only content of a possible SDARS service. The total value of that coalition is zero, because it costs $40/month to operate the service, and sports generates only $15/month in revenue. The "Incremental Value Sports" column is listed as zero, because sports is the last player adding incremental value to the service, but the value it brings is zero, because there is no service.

Finally, I describe the operation on the very last row, "S+M+T." This describes a service that provides all three kinds of content. Talk is the last player added in this combination, so the row is designed to test the value that is added when talk joins a coalition that already exists made

up of sports plus music. The total value of the coalition is 60. That is so because the three services are generating $100/month in revenue, but it costs $40/month to operate the SDARS, leaving a surplus of $60. Talk brings 25 new customers to this service, or $25/month in added revenue. Therefore in this last row, in the last column "Incremental Value Talk," talk is given credit for those 25 new customers. Because the other players were already part of the coalition and were not the last to join, the columns representing the incremental value they bring as the last player to the game are left blank.

After all possible permutations of the coalition are considered, all possible incremental value totals for each separate service are summed up. That is, for example, all of the values that appear in the "Incremental Value Music" column are added together, making a total incremental value equal to 240 (20+20+35+45+60+60). Then an *average* incremental value for each content player is calculated by taking, for example, the total incremental value added by music (240), and dividing it by the number of times it added incremental value (6). Music's average incremental value in the game is thus 240/6, or 40.

As is indicated at the bottom of the chart, the same operation yields an average incremental value for sports of 7.5, and for talk of 12.5.

Finally, each content's incremental value can be restated as a percentage of the entire incremental value created by the game. The total incremental value created by the game is 40+7.5+12.5, or 60. Music's Shapley value is thus 40/60 or 66.7%, Sport's Shapley value is 7.5/60 or 12.52%, and Talk's Shapley value is 12.5/60 or 20.8%.

We now know, based on this simple model, how much each content provider would fairly get if there were $60/month of surplus to be divided, as there is in this hypothetical.

Music would get 66.7% of $60 or $40.00/month; sports would get 12.5% of $60 or $7.50, and talk would get 20.8% of $60 or $12.50.

The Shapley model used in my testimony had many more variables, but it operates in exactly the same manner as this hypothetical example.

Appendix III - Shapley Values from Alternative Scenarios

Actual Music Shares Weighted to 41.327 Pct - Second SDARS 0.05 Share - .268625908 (65 Pct) Music Constraint - Minimum Coalition 0.5

Obs	Name	Content_Share	Shapley	ratio
1	Radio1	0.00%	6.345%	.
2	Radio2	5.00%	6.345%	.
3	Music_Universal1	13.10%	17.999%	.
4	Music_Sony1	10.87%	12.348%	.
5	Music_Warner1	7.98%	8.141%	.
6	Music_EMI1	4.13%	5.949%	.
7	Music_smA1	1.75%	2.416%	.
8	Music_smB1	1.75%	2.416%	.
9	Music_smC1	1.75%	2.416%	.
10	TalkA1	13.57%	9.034%	.
11	TalkB1	4.52%	2.995%	.
12	SportsA1	12.05%	8.001%	.
13	SportsB1	6.02%	3.989%	.
14	NewsA1	10.94%	7.260%	.
15	NewsB1	6.56%	4.348%	.
16	All Music	41.33%	51.683%	.
17	Other Content	53.67%	35.626%	.
18	Music vs. Other Cont	.	.	145.1%

Appendix III - Shapley Values from Alternative Scenarios

Actual Music Shares Weighted to 41.327 Pct - Second SDARS 0.05 Share - .268625908 (65 Pct) Music Constraint - Minimum Coalition 0.6

Obs	Name	Content_Share	Shapley	ratio
1	Radio1	0.00%	5.953%	.
2	Radio2	5.00%	5.953%	.
3	Music_Universal1	13.10%	15.917%	.
4	Music_Sony1	10.87%	11.478%	.
5	Music_Warner1	7.98%	7.846%	.
6	Music_EMI1	4.13%	5.314%	.
7	Music_smA1	1.75%	2.219%	.
8	Music_smB1	1.75%	2.219%	.
9	Music_smC1	1.75%	2.219%	.
10	TalkA1	13.57%	10.324%	.
11	TalkB1	4.52%	3.461%	.
12	SportsA1	12.05%	9.163%	.
13	SportsB1	6.02%	4.598%	.
14	NewsA1	10.94%	8.326%	.
15	NewsB1	6.56%	5.010%	.
16	All Music	41.33%	47.212%	.
17	Other Content	53.67%	40.881%	.
18	Music vs. Other Cont	.	.	115.5%

Appendix III - Shapley Values from Alternative Scenarios

Actual Music Shares Weighted to 41.327 Pct - Second SDARS 0.05 Share - .309952971 (75 Pct) Music Constraint - Minimum Coalition 0.5

Obs	Name	Content_Share	Shapley	ratio
1	Radio1	0.00%	5.028%	.
2	Radio2	5.00%	5.028%	.
3	Music_Universal1	13.10%	22.870%	.
4	Music_Sony1	10.87%	22.870%	.
5	Music_Warner1	7.98%	7.698%	.
6	Music_EMI1	4.13%	4.044%	.
7	Music_smA1	1.75%	1.502%	.
8	Music_smB1	1.75%	1.502%	.
9	Music_smC1	1.75%	1.502%	.
10	TalkA1	13.57%	7.083%	.
11	TalkB1	4.52%	2.352%	.
12	SportsA1	12.05%	6.278%	.
13	SportsB1	6.02%	3.131%	.
14	NewsA1	10.94%	5.698%	.
15	NewsB1	6.56%	3.414%	.
16	All Music	41.33%	61.988%	.
17	Other Content	53.67%	27.955%	.
18	Music vs. Other Cont	.	.	221.7%

Appendix III - Shapley Values from Alternative Scenarios

Actual Music Shares Weighted to 41.327 Pct - Second SDARS 0.05 Share - .309952971 (75 Pct) Music Constraint - Minimum Coalition 0.6

Obs	Name	Content_Share	Shapley	ratio
1	Radio1	0.00%	4.907%	.
2	Radio2	5.00%	4.907%	.
3	Music_Universal1	13.10%	20.512%	.
4	Music_Sony1	10.87%	20.512%	.
5	Music_Warner1	7.98%	7.469%	.
6	Music_EMI1	4.13%	3.966%	.
7	Music_smA1	1.75%	1.508%	.
8	Music_smB1	1.75%	1.508%	.
9	Music_smC1	1.75%	1.508%	.
10	TalkA1	13.57%	8.406%	.
11	TalkB1	4.52%	2.800%	.
12	SportsA1	12.05%	7.450%	.
13	SportsB1	6.02%	3.726%	.
14	NewsA1	10.94%	6.764%	.
15	NewsB1	6.56%	4.060%	.
16	All Music	41.33%	56.981%	.
17	Other Content	53.67%	33.206%	.
18	Music vs. Other Cont	.	.	171.6%

Appendix III - Shapley Values from Alternative Scenarios

Actual Music Shares Weighted to 41.327 Pct - Second SDARS 0.05 Share - .371943565 (90 Pct) Music Constraint - Minimum Coalition 0.5

Obs	Name	Content_Share	Shapley	ratio
1	Radio1	0.00%	3.487%	.
2	Radio2	5.00%	3.487%	.
3	Music_Universal1	13.10%	17.463%	.
4	Music_Sony1	10.87%	17.463%	.
5	Music_Warner1	7.98%	17.463%	.
6	Music_EMI1	4.13%	17.463%	.
7	Music_smA1	1.75%	1.040%	.
8	Music_smB1	1.75%	1.040%	.
9	Music_smC1	1.75%	1.040%	.
10	TalkA1	13.57%	5.076%	.
11	TalkB1	4.52%	1.689%	.
12	SportsA1	12.05%	4.503%	.
13	SportsB1	6.02%	2.248%	.
14	NewsA1	10.94%	4.088%	.
15	NewsB1	6.56%	2.451%	.
16	All Music	41.33%	72.972%	.
17	Other Content	53.67%	20.055%	.
18	Music vs. Other Cont	.	.	363.9%

Appendix III - Shapley Values from Alternative Scenarios

Actual Music Shares Weighted to 41.327 Pct - Second SDARS 0.05 Share - .371943565 (90 Pct) Music Constraint - Minimum Coalition 0.6

Obs	Name	Content_Share	Shapley	ratio
1	Radio1	0.00%	3.581%	.
2	Radio2	5.00%	3.581%	.
3	Music_Universal1	13.10%	16.247%	.
4	Music_Sony1	10.87%	16.247%	.
5	Music_Warner1	7.98%	16.247%	.
6	Music_EMI1	4.13%	16.247%	.
7	Music_smA1	1.75%	1.107%	.
8	Music_smB1	1.75%	1.107%	.
9	Music_smC1	1.75%	1.107%	.
10	TalkA1	13.57%	6.210%	.
11	TalkB1	4.52%	2.067%	.
12	SportsA1	12.05%	5.505%	.
13	SportsB1	6.02%	2.752%	.
14	NewsA1	10.94%	4.997%	.
15	NewsB1	6.56%	2.999%	.
16	All Music	41.33%	68.308%	.
17	Other Content	53.67%	24.530%	.
18	Music vs. Other Cont	.	.	278.5%

Appendix III - Shapley Values from Alternative Scenarios

Even Music Shares Weighted to 41.327 Pct - Second SDARS 0.05 Share - .268625908 (65 Pct) Music Constraint - Minimum Coalition 0.5

Obs	Name	Content_Share	Shapley	ratio
1	Radio1	0.00%	6.195%	.
2	Radio2	5.00%	6.195%	.
3	Music_Universal1	5.90%	7.387%	.
4	Music_Sony1	5.90%	7.387%	.
5	Music_Warner1	5.90%	7.387%	.
6	Music_EMI1	5.90%	7.387%	.
7	Music_smA1	5.90%	7.387%	.
8	Music_smB1	5.90%	7.387%	.
9	Music_smC1	5.90%	7.387%	.
10	TalkA1	13.57%	9.098%	.
11	TalkB1	4.52%	3.020%	.
12	SportsA1	12.05%	8.063%	.
13	SportsB1	6.02%	4.023%	.
14	NewsA1	10.94%	7.314%	.
15	NewsB1	6.56%	4.385%	.
16	All Music	41.33%	51.706%	.
17	Other Content	53.67%	35.904%	.
18	Music vs. Other Cont	.	.	144.0%

Appendix III - Shapley Values from Alternative Scenarios

Even Music Shares Weighted to 41.327 Pct - Second SDARS 0.05 Share - .268625908 (65 Pct) Music Constraint - Minimum Coalition 0.6

Obs	Name	Content Share	Shapley	ratio
1	Radio1	0.00%	5.858%	.
2	Radio2	5.00%	5.858%	.
3	Music_Universal1	5.90%	6.712%	.
4	Music_Sony1	5.90%	6.712%	.
5	Music_Warner1	5.90%	6.712%	.
6	Music_EMI1	5.90%	6.712%	.
7	Music_smA1	5.90%	6.712%	.
8	Music_smB1	5.90%	6.712%	.
9	Music_smC1	5.90%	6.712%	.
10	TalkA1	13.57%	10.407%	.
11	TalkB1	4.52%	3.508%	.
12	SportsA1	12.05%	9.255%	.
13	SportsB1	6.02%	4.649%	.
14	NewsA1	10.94%	8.418%	.
15	NewsB1	6.56%	5.064%	.
16	All Music	41.33%	46.984%	.
17	Other Content	53.67%	41.301%	.
18	Music vs. Other Cont	.	.	113.8%

Appendix III - Shapley Values from Alternative Scenarios

Even Music Shares Weighted to 41.327 Pct - Second SDARS 0.05 Share - .309952971 (75 Pct) Music Constraint - Minimum Coalition 0.5

Obs	Name	Content_Share	Shapley	ratio
1	Radio1	0.00%	4.317%	.
2	Radio2	5.00%	4.317%	.
3	Music_Universal1	5.90%	9.419%	.
4	Music_Sony1	5.90%	9.419%	.
5	Music_Warner1	5.90%	9.419%	.
6	Music_EMI1	5.90%	9.419%	.
7	Music_smA1	5.90%	9.419%	.
8	Music_smB1	5.90%	9.419%	.
9	Music_smC1	5.90%	9.419%	.
10	TalkA1	13.57%	6.438%	.
11	TalkB1	4.52%	2.142%	.
12	SportsA1	12.05%	5.710%	.
13	SportsB1	6.02%	2.852%	.
14	NewsA1	10.94%	5.183%	.
15	NewsB1	6.56%	3.109%	.
16	All Music	41.33%	65.934%	.
17	Other Content	53.67%	25.433%	.
18	Music vs. Other Cont	.	.	259.2%

Appendix III - Shapley Values from Alternative Scenarios

Even Music Shares Weighted to 41.327 Pct - Second SDARS 0.05 Share - .309952971 (75 Pct) Music Constraint - Minimum Coalition 0.6

Obs	Name	Content Share	Shapley	ratio
1	Radio1	0.00%	4.373%	.
2	Radio2	5.00%	4.373%	.
3	Music_Universal1	5.90%	8.638%	.
4	Music_Sony1	5.90%	8.638%	.
5	Music_Warner1	5.90%	8.638%	.
6	Music_EMI1	5.90%	8.638%	.
7	Music_smA1	5.90%	8.638%	.
8	Music_smB1	5.90%	8.638%	.
9	Music_smC1	5.90%	8.638%	.
10	TalkA1	13.57%	7.783%	.
11	TalkB1	4.52%	2.602%	.
12	SportsA1	12.05%	6.906%	.
13	SportsB1	6.02%	3.456%	.
14	NewsA1	10.94%	6.275%	.
15	NewsB1	6.56%	3.765%	.
16	All Music	41.33%	60.468%	.
17	Other Content	53.67%	30.787%	.
18	Music vs. Other Cont	.	.	196.4%

Appendix III - Shapley Values from Alternative Scenarios

Even Music Shares Weighted to 41.327 Pct - Second SDARS 0.05 Share - .371943565 (90 Pct) Music Constraint - Minimum Coalition 0.5

Obs	Name	Content Share	Shapley	ratio
1	Radio1	0.00%	2.063%	.
2	Radio2	5.00%	2.063%	.
3	Music_Universal1	5.90%	11.824%	.
4	Music_Sony1	5.90%	11.824%	.
5	Music_Warner1	5.90%	11.824%	.
6	Music_EMI1	5.90%	11.824%	.
7	Music_smA1	5.90%	11.824%	.
8	Music_smB1	5.90%	11.824%	.
9	Music_smC1	5.90%	11.824%	.
10	TalkA1	13.57%	3.316%	.
11	TalkB1	4.52%	1.105%	.
12	SportsA1	12.05%	2.942%	.
13	SportsB1	6.02%	1.471%	.
14	NewsA1	10.94%	2.672%	.
15	NewsB1	6.56%	1.603%	.
16	All Music	41.33%	82.765%	.
17	Other Content	53.67%	13.109%	.
18	Music vs. Other Cont	.	.	631.4%

Appendix III - Shapley Values from Alternative Scenarios

Even Music Shares Weighted to 41.327 Pct - Second SDARS 0.05 Share - .371943565 (90 Pct) Music Constraint - Minimum Coalition 0.6

Obs	Name	Content Share	Shapley	ratio
1	Radio1	0.00%	2.231%	.
2	Radio2	5.00%	2.231%	.
3	Music_Universal1	5.90%	11.324%	.
4	Music_Sony1	5.90%	11.324%	.
5	Music_Warner1	5.90%	11.324%	.
6	Music_EMI1	5.90%	11.324%	.
7	Music_smA1	5.90%	11.324%	.
8	Music_smB1	5.90%	11.324%	.
9	Music_smC1	5.90%	11.324%	.
10	TalkA1	13.57%	4.117%	.
11	TalkB1	4.52%	1.372%	.
12	SportsA1	12.05%	3.652%	.
13	SportsB1	6.02%	1.826%	.
14	NewsA1	10.94%	3.316%	.
15	NewsB1	6.56%	1.990%	.
16	All Music	41.33%	79.265%	.
17	Other Content	53.67%	16.273%	.
18	Music vs. Other Cont	.	.	487.1%

APPENDIX IV -- STEADY STATE SURPLUS ANALYSIS

To test the fairness of the proposed royalty during years when the SDARS were spending heavily to promote future growth of their business, I calculated the surplus that would be earned in each year between 2007 and 2011, assuming the SDARS reached a steady state that year, and did not expect to add subscribers beyond that point in time. This will require the SDARS to bring in new subscribers when the existing subscribers leave, and, as a result, the SDARS will incur subscriber acquisition costs. However, these costs will be lower than the costs shown on the corresponding pro forma statements provided by Mr. Butson. He estimates the costs of a rapidly growing SDARS, which will be substantial higher than for an SDARS that has reached a steady state.

I have calculated the annual per-subscriber surplus by constructing a "cost function" for the average SDARS. A cost function presents the relationship between costs and output. For example, a hypothetical, simple cost function for an SDARS might be represented by the following equation:

Monthly cost = $45 million + $5.00 x "number of subscribers"

In this example, the SDARS incurs fixed cost of $45 million per month and variable cost of $5.00 per subscriber per month. Therefore, if the number of subscribers were 10 million, the SDARS' total monthly cost would be $95 million ($45 million + $5.00 x 10 million). The average cost per subscriber per month would be $9.50.

I construct the SDARS cost function out of three inputs: (1) fixed expenses; (2) fixed capital cost; (3) variable cost. The fixed expenses represent the cost of satellite and broadcast operations, G&A, R&D. Some of these costs will be modestly sensitive to the output of the firm. Therefore, I will rely on the estimated level of these costs in Mr. Butson's pro forma statements

for these years. The second category, fixed capital costs, is the capital carrying charges associated with the satellite and other facilities of the SDARS. I use the same estimate as in the 2012 case described in the body of my testimony, $228.8 million. I am making a conservative assumption that the SDARS would build the same facilities to serve a smaller number of subscribers than it is actually projected to serve. Variable cost include: revenue share; royalties; customer care and billing, cost of merchandise, ad sales, subsidies and distribution, and marketing. Mr. Butson estimates that these costs will be 43.5% of revenue in a steady-state.

Based on these parameter estimates, I then calculate a "steady-state surplus" for each year, using Mr. Butson's estimate of the number of subscribers and the revenues per subscriber. There is no reason, however, that the license fees in each year should be based on that year's steady-state surplus. SDARS are in a growth state and willing make investments in fixed facilities, customer acquisition, and content to growth their business. As stated earlier, payments to other content providers are not based on the SDARS' profit during that year, nor are they tied to the number of customers or revenues for each year (which would be true if the content fees were based on a steady-state model.)

Nevertheless, one way to examine a rate proposal for the entire license period is to use the values from the Shapley solution to the model with this steady state surplus as follows:

Present value of the expected revenue to be collected under proposed fees Less than or equal to: Present value of the Shapley-based share of the expected steady-state surplus in each year

Applying this test here, it confirms that SoundExchange's rate satisfies the statutory factors, in light of the SDARS' rapid growth, and the dependence of the SDARS' on music to attract customers.

Exhibit Sponsored by Michael Pelcovits

Exhibit No.	Description
SX Ex. 103 DR	Citigroup research report on Warner Music Group (Sept. 22, 2005)