TRANSCRIPT OF PROCEEDINGS

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IN THE MATTER OF:               )
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DETERMINATION OF RATES AND TERMS)  Docket No.
FOR DIGITAL PERFORMANCE OF SOUND) 19-CRB-0005-WR
RECORDINGS AND MAKING OF        )  (2021-2025)
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THOSE PERFORMANCES (WEB V)      )
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BEFORE: THE HONORABLE JESSE M. FEDER
THE HONORABLE DAVID R. STRICKLER
THE HONORABLE STEVE RUWE

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** All Appearances by Zoom Webinar **

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** Index appears at end of transcript.

P R O C E E D I N G S

(10:30 a.m.)

THE CLERK: Let's raise the curtain.

MR. SACK: Curtain is raised.

CHIEF JUDGE FEDER: Good morning. Let us begin this session.

Before you begin your examination, Mr. Marks, there are a couple of housekeeping items that I would like the clerk to discuss.

THE CLERK: Thank you, Your Honor. I'd just like to ask folks who are filing exhibits during the hearing to make sure you put something other than just the exhibit number in the title field. Ideally, it should match the description on the exhibit list, what you put in the title field. Secondly, several exhibits were rejected when originally filed for various reasons, and they have not been refiled. So please pay attention to the e-mails that you get when filings are rejected.

I think that's -- oh, the other thing is that when you file your exhibits or any kind of motion, please don't use all caps in the title field. Thank you.

CHIEF JUDGE FEDER: Thank you, Ms. Whittle.

Is there anything to discuss before we go --

before we call the first witness?

MR. MARKS: Yes, there is, Your Honor.

MR. WARREN: Your Honor, I have one --

CHIEF JUDGE FEDER: I'm sorry. Go ahead, Mr. Warren.

MR. WARREN: Thanks, Mr. Marks. Yeah, I have one brief housekeeping matter. There were four exhibits that were added to the amended exhibit list as to which there are no objections, so I was -- I would like to just move to have those admitted into evidence. Those are Exhibits 5453, 5457, 5460, and 5463.

CHIEF JUDGE FEDER: Could I have those numbers again a little more slowly?

MR. WARREN: Yes, Your Honor, of course. 5453, 5457, 5460, and 5463.

CHIEF JUDGE FEDER: Okay. Exhibits 5453, 5457, 5460, and 5463 are admitted without objection.

(SoundExchange Exhibit Numbers 5453, 5457, 5460, and 5463 were received into evidence.)

MR. WARREN: Thank you, Your Honor.

CHIEF JUDGE FEDER: Mr. Marks?

MR. MARKS: Yes, Your Honor. There -- I just wanted to raise one issue before we begin with the witness, which is that the slides that this witness is using as a demonstrative contain improper new analysis that's surrebuttal. There are references on 67, and the new analysis is contained on slide 69. I'm happy to wait and address it when we get there, or we can address it now, Your Honor, but this is clearly new analysis done after the submission of written rebuttal cases, and we don't think it's appropriate to hear testimony or for them to display the slides.

CHIEF JUDGE FEDER: All right. Let's address that when we get to it in the -- in the questioning.

MR. MARKS: That's fine.

CHIEF JUDGE FEDER: Okay. Mr. Warren, please call your first witness.

MR. WARREN: Thank you, Your Honor.

MR. TOTH: We are taking him off hold now. Stand by. Judge, we will go live when you tell us to.

CHIEF JUDGE FEDER: Okay. Go live and we'll swear the witness.

MR. TOTH: Stand by. We are live.

CHIEF JUDGE FEDER: Professor Willig, please raise your right hand.

Whereupon--

ROBERT WILLIG,

having been first duly sworn, was examined and testified as follows:

CHIEF JUDGE FEDER: Please proceed, Mr. Warren.

MR. WARREN: Thank you, Your Honor.

DIRECT EXAMINATION

BY MR. WARREN:

Q. And good morning, Professor. Could you please introduce yourself to the Judges.

A. Good morning, counsel. My name is Robert Willig.

Q. And have you prepared a PowerPoint to guide us through the conversation today?

A. Yes, I have.

Q. So let's begin with the first slide. Could you tell us a little bit about your educational background, please.

A. Sure. Public high school in Brooklyn, New York. Very good education. Went from there to Harvard for my undergraduate degree. Went from there to Stanford University for a Master's in operations research and my Ph.D. in economics.

Q. All right. And you're currently a professor?

A. I am. I'm called Professor Emeritus of Economics and Public Affairs at Princeton University, emeritus means -- I don't know, old and distinguished, I guess. Semi-retired, but I'm still teaching, actively, as I always have, my favorite course called legal and regulatory policy toward markets, to graduate students, which I taught this spring under Zoom conditions, which was pretty good, I think.

Q. Well, hopefully, it stays good today. Can you give us a sense of the other subjects that you've taught over the course of your career?

A. I've taught a lot of microeconomics, foundational micro to all levels, all the way from freshmen in the college to Ph.D. students. Also, I've done a lot of teaching in the general field of industrial organization, which is a subfield of microeconomics. And that, too, I have taught at all levels, undergraduate as well as Ph.D. levels.

Q. Very well. And can you tell us briefly about your academic research?

A. Sure. My academic research has centered on industrial organization and also what I like to call social welfare economics, evaluations of public policies from an overall social welfare perspective and building tools to do that in a scientific way. And I've been applying that essentially all of my professional life, the combination of those two areas in terms of public policy toward business, government/business relationships, and hence the course legal and regulatory policy, it's all about that area, but developed from an economic perspective.

So it's basically an economics course because what I do is apply economics tools to those policy issues.

Q. Has any of your work involved the use of statistics to reach economic conclusions?

A. Sure. All -- all of my -- well, the lion's share of my applied work on projects has been founded on empirical results, handled with tools of statistics, which, as you know, in economics we call econometrics.

And so I am a frequent user of the tools of econometrics, and that was part of my training in graduate school as well.

Q. And has any of your work involved the use of survey results to reach economic conclusions?

A. Yes. I have used the results of surveys in some areas of my applied work rather intensively, I would say. Consumer surveys and also surveys of businesses, surveys of enterprises, actually around the world.

Q. And why don't you tell us briefly about your career outside of the academy, please.

A. Outside of the academy, well, my first job was in the Economics Research Department at Bell Laboratories. So my employer was not a university then, but that was actually a more academic research-oriented job than actually exists in the academy, which is full of other concerns like administrative work and guiding the students.

I have been a consultant to governments and international organizations, law firms, major corporations, ever since the beginnings of my career. And I helped to found the consulting firm Compass Lexecon some 15, 20 years ago, and so I've done a lot of consulting work, expert witness work, through that firm and through other firms as well.

Q. Have you been qualified as an expert in any past proceedings?

A. Yes, many times.

Q. And could you tell us what subjects you were qualified to testify about?

A. Microeconomics generally, industrial

organization in particular, antitrust issues, competition issues. Intellectual property issues comes up a great deal, it always has. And I've done that work both for the private sector but also in government as well.

Q. And please tell us a little bit more about your expert work related to intellectual property issues.

A. Well, I did appear before these Judges, before this same board, in SDARS III on the subject of royalties to be paid by -- by satellite delivery of streaming music. I've done lots of work on intellectual property generally in pharmaceuticals, in high technology, in software, in consumer products as well.

I've applied issues involving intellectual property to tax issues, so in terms of the assessment of what sorts of returns flow from intellectual property and where, what -- what jurisdiction, what collections of assets should be reviewed as responsible for generating those returns from intellectual property.

I've also done work both theoretical and applied at the interface of intellectual property rights and competition policy, because sometimes antitrust and protection of intellectual property create tensions between the two of them as a matter of policy, and I've done some serious academic-style research as well as applications in that area.

Q. Thank you, Professor.

MR. WARREN: So, Your Honors, at this time, I tender Professor Willig as an expert qualified to testify and render an opinion in the fields of microeconomics, industrial organization, the use of statistics in economics, and the use of survey research and economics.

MR. MARKS: No objection, Your Honor.

CHIEF JUDGE FEDER: Without objection, the witness is so qualified.

MR. WARREN: Thank you, Your Honor.

BY MR. WARREN:

Q. Professor, have you submitted written testimony in this proceeding?

A. Yes, I have.

Q. All right. Please direct your attention to Exhibit 5600, 5-6-0-0.

A. Yes.

Q. And what is this document?

A. Well, this is the cover sheet, but I presume the document lies behind it -- there it is -- of my

corrected written direct testimony in this case.
Q. All right. And did you write this?
A. Yes, I did.
Q. Please turn to page 40 of the PDF. Is this your signature?
A. Yes, it is.
Q. All right.
MR. WARREN: Your Honors, I move that Exhibit 5600 be admitted into evidence.
MR. MARKS: Your Honors, the parties have submitted -- or the services have submitted certain objections in writing to portions of Dr. Willig's corrected written direct testimony.
We understood that the purpose of submitting the objections in writing was so that we wouldn't have to debate those on a paragraph-by-paragraph basis now. Subject to and without waiving our objections that have been submitted in writing, we're prepared to move on at this point.
CHIEF JUDGE FEDER: Subject to those objections, upon which we will rule at a later date, Exhibit 5600 is admitted.
(SoundExchange Exhibit Number 5600 was received into evidence.)
MR. WARREN: Thank you, Your Honor.

BY MR. WARREN:

Q. Professor, please turn your attention to Exhibit 5601. What is this document?

A. This is my written rebuttal testimony.

Q. Did you write this?

A. I did.

Q. Please turn to page 75 of the PDF. Is that your signature?

A. Yes, it is.

MR. WARREN: Your Honors, I move that Exhibit 5601 be admitted into evidence, and I understand that this will be subject to the same colloquy that we just had about the corrected written direct testimony.

CHIEF JUDGE FEDER: Mr. Marks?

MR. MARKS: Yes, the -- the objections that we have, have already been submitted in writing and -- and we'd like to reserve those objections.

CHIEF JUDGE FEDER: Subject to those objections, upon which we will rule at a later date, Exhibit 5601 is admitted.

(SoundExchange Exhibit Number 5601 was received into evidence.)

MR. WARREN: Thank you, Your Honor.

BY MR. WARREN:

Q. Let's return to the demonstrative, please. Professor, what were you asked to do in this case?
A. I was asked to assess quantitatively, as well as the theory underlying the numbers, the sound recording royalties for both ad-supported and subscription commercial non-interactive webcasters.
Q. What is the standard --
A. I was also -- I'm sorry.
Q. I'm sorry, Professor.
A. I was also asked to respond to the bargaining approach used by the economic experts for the commercial webcasters.
Q. And what is the standard that you applied in making your assessment of sound recording royalties?
A. That standard that I applied is what willing buyers and willing sellers would negotiate in a hypothetical marketplace without the statutory license in place.
Q. Professor, what approach did you take to your assignment?
A. So, overall, I apply the economics of bargaining theory to circumstances like this one, but with the aim of developing a practical model that's actually capable of coming out with a quantitative answer. So it's a strong move toward practicality

from the domain of economic theory about the economics of bargaining and negotiations. It has got to be practical because that's my assignment and that's the aim of this hearing.

Q. Professor --

A. That's the first leg of the approach.

Q. Apologize. I will try my hardest not to cut you off. It can be a little hard sometimes with the Zoom lag, so my apologies if I trip over you.

I did just want to ask, what real world inputs did you consider and apply to your model?

A. The model, in order to develop a practical answer, needs inputs, which are based on data about reality, about the marketplace. So for that, I employed royalty data, I employed the results of surveys of consumers in this marketplace, and also financial data about the representative services that stand in generally for the categories of ad-supported and subscription-supported commercial non-interactive webcasters.

Q. Very well. And did you attempt to assess the sensitivity of the results that you determined from your model?

A. Yeah, I -- I did that. So in order to test out and corroborate the precise answers coming out of my primary approach, I did sensitivity tests of that approach by changing one assumption, changing another assumption, mixing in my own assumptions with those put forward by Professor Shapiro in his work in this case. To see what the quantitative answers would be under those varieties of sensitivity tests.

Q. Thank you, Professor.

Now, we have a roadmap here of your testimony. Could you very briefly walk us through this roadmap and what you'll be talking about today?

A. Sure. Module 1 is actually to drive toward showing the royalty rates that are derived from the Shapley Value tool applied to the issues at hand. So to get there, I am going to explain what is the Shapley Value and what is that approach. I'm going to delineate what are the quantitative inputs into my modeling based on Shapley Value. That goes to the subcategories which are very important for the willing buyer/willing seller standard, what is the opportunity cost of the record companies for being part of the enterprises at issue, and when it comes to the willingness of the buyers to buy, what is their willingness to pay.

And the answer has to be bounded, where it can be, by those two elements of the standard. So

I'll talk about how the inputs go to those -- those two portions of the range of the answers. And I'll also show the outputs, what is the bottom line of -- of this entire course of analysis. That's all within the first module.

Q. Okay. And what's the second module?

A. The second module is to bring forward the fact that there are disputes between my approach and those taken by the economists who are experts for the services, parties to this -- this hearing. In particular, these disputes can be categorized as pertaining to opportunity cost and to the financials, the financial data and where do they come from, going into our modeling, and also which bargaining models to employ in the first place.

So I have some disputes on -- with the services' economists on each of those three areas.

JUDGE STRICKLER: Professor -- excuse me, counsel. Professor Willig, this is Judge Strickler. Can you hear me okay?

THE WITNESS: I can, and it's a pleasure to be with you. Thank you, Judge Strickler.

JUDGE STRICKLER: Pleasure to have you here again, Professor. I have a question for you with regard to the roadmap demonstrative we have on the screen.

THE WITNESS: Yes, sir.

JUDGE STRICKLER: With regard to the inputs that you list there, you list record company opportunity cost. Why did you not also include any other variable costs that the record companies would -- would incur?

THE WITNESS: I don't ignore those, but I don't actually need to quantify them, interestingly, because the record companies will be experiencing that in -- in their own operations, in their own marketplace, and the aim here is to develop quantifications for the royalties, which will accrue to the record companies as they will be experiencing their own costs.

And so the model actually doesn't need estimates of the out-of-pocket costs of the record companies to develop answers for the royalties that should be paid to them.

JUDGE STRICKLER: So you -- so you stated that you didn't quantify them, but you did not ignore them. In what way did you turn your attention to them; that is to say, did not ignore them?

THE WITNESS: Right. They are -- they are represented in the Shapley Value model, but they don't have to be quantified in order to derive the answers about the royalties. That's the aim of my use of the Shapley Value tool.

JUDGE STRICKLER: Where are they represented in the Shapley Value, Professor?

THE WITNESS: In the algebra that underlies the calculations for the Shapley Value, when I looked at the algebra for determining the Shapley Value and then asked algebraically where are the royalties, the royalties are the amount of money that needs to be paid to the record companies to get them to their Shapley Values.

JUDGE STRICKLER: Is it fair --

THE WITNESS: And so that -- I'm sorry?

JUDGE STRICKLER: I'm sorry, please, proceed.

THE WITNESS: Yes. So that quantification doesn't need a quantification of the costs they experience.

JUDGE STRICKLER: So if I understand this correctly, are you saying that the -- the other costs, the other variable costs are expressed in the fall-back value that the record companies need to be paid in order for them to proceed?

THE WITNESS: What they need to be paid from outside sources doesn't include the costs, but is there as -- in the algebra, as what determines their profitability if they're alone or if they're with the other parties in the enterprise, which is the streaming services.

JUDGE STRICKLER: And one other question about costs, switching over to the other side, the license -- licensee side. Your model does not include any data that relates to the licensee's costs; is that correct?

THE WITNESS: The -- the services themselves, Judge?

JUDGE STRICKLER: The services, yes.

THE WITNESS: Yes. Yes, the cost of the services are intrinsic to the Shapley Value calculation because part of the value that's created by the enterprise is the fact that they have cost as a deduction from the moneys they take in from their activities. And so the profitability of the services is an intrinsic part of the Shapley Value and the calculation of the royalties as well.

JUDGE STRICKLER: Thank you, Professor.

MR. WARREN: Thank you, Judge Strickler.

BY MR. WARREN:

Q. I think we can move on from this roadmap, but before we do, Professor, can you briefly preview module 3 for us.

A. Yes, thank you. So module 3 is showing and explaining the sensitivity tests that I have run, sensitivities to my primary model, and to explain leading candidates of those sensitivity tests and to show that those sensitivity tests do not imply any major change in the actual quantified numbers that come out of my primary Shapley Value results.

Q. Very well. And before we launch into the specifics, I see you have an executive summary that's a couple slides long. And I'm hopeful that we can take a few minutes to just summarize your approach and your findings.

So at a very high level, can you explain what the Shapley Value approach is and why you decided to employ it?

A. Sure. What it is, is a tool that is designed to capture what is the value created by cooperation in an enterprise of different parties who are all involved in that enterprise, and the Shapley Value is designed to indicate what should be the apportionment of the gains, the extra value created by that enterprise, among the parties who are working together to make that enterprise be operational.

So it's a tool to assess value and to apportion that value among the intrinsic parties.

Q. And why did you employ that?

JUDGE STRICKLER: Excuse me, Mr. Warren. Professor Willig, another question for you.

You mention in your second bullet point on this module that the Shapley Value was cited approvingly in the Phonorecords III decision. If the Phonorecords III decision did not exist or had not used the Shapley Value, would you have found the Shapley Value to be nonetheless the best model to use in order to determine royalty rates for this proceeding?

THE WITNESS: I think so, for the other reasons that I mention here and talk about again later, but it certainly was a spur that it was -- it did come up in Phonorecords III and that it was cited approvingly. That helped to persuade everybody that it's a good idea to use this model, but in terms of my economics, it is the primary model to apply to a problem like this.

JUDGE STRICKLER: Okay. I ask that in conjunction with the third bullet point you have there, where you refer to this Shapley Value as a concept and say it's a standout concept. And that's why I was asking you, is it just a standout concept or it is the best -- in your opinion, the best concept, the best model to use in this proceeding?

THE WITNESS: I think it is the best model to use in this proceeding. As I'll explain later, but I'm happy to talk about it now, Professor Shapiro puts forward a different concept called Nash-in-Nash, which is an awkward title, but it's understandable, given what it is.

And it does have currency in the economic literature, and it is a good tool also, but I think that, given the concept of what's going on in this matter through the lens of Professor Shapiro's work, that Shapley is a superior model to the Nash-in-Nash model for the purposes at hand.

It's interesting that under the viewpoint that the three major record companies are must-haves for these services, that the Shapley Value and the Nash-in-Nash viewpoint and also another model that Professor Shapiro refers to may all come together. They all give the same answer under the view that the majors are all must-haves.

They only start separating from each other under the alternative perspectives that seems to energize Professor Shapiro's work.

JUDGE STRICKLER: Thank you, Professor.

MR. WARREN: Thank you, Your Honor.

BY MR. WARREN:

Q. So moving to this next slide, Professor --

A. Counsel, could we go back to the previous slide?

Q. Of course.

A. Because I want to explain not only the concept of the Shapley Value but some contours of the way I apply it here, because the moment an analyst begins to try to assess apportionment of total value through the Shapley tool, it's necessary to delineate who the parties are, after all.

And so I've done that here. And the slide shows who the parties are that appear in the negotiations that I am modeling through the Shapley Value approach. So there's six bargaining parties in my approach. The first one, as it shows on the slide, is a representative ad-supported non-interactive service that's obviously a party to these negotiations, a representative subscription non-interactive service, the three major record companies individually, and then also I employ an amalgam independent record company. Instead of adding to the model every one of the very, very many independent record companies, I have aggregated them together in the modeling as one amalgam party to the negotiations.

And I understand that the way I do my modeling, that is not a distortion, actually, and, if anything, it's on the conservative side, but it certainly helps to make the model understandable and -- and practical.

JUDGE STRICKLER: Professor Willig, Judge Strickler here again. Can you talk about the importance of identifying who the participants are? Just by way of example, the importance of that, and I think referring to your rebuttal testimony, you point out that if you changed the configuration of how many parties there are on the licensor or licensee side, you could actually change the outcome with regard to Shapley values and ultimately the royalty rate. Isn't that so?

THE WITNESS: I'm -- I'm not sure what context that came up in my rebuttal precisely, but as I remember Professor Shapiro or somebody said if I had collapsed the three majors into one, that would alter the results. Is that what you're referring to?

JUDGE STRICKLER: That would be an example of the --

THE WITNESS: That would be an example indeed. So, sure, it's going to matter, perhaps. In some ways it can matter; in some ways it won't matter. I did persuade myself -- and I think I could persuade anybody else as well, given time -- that it didn't significantly change the results to create the amalgam of the many independent record companies into one because I treat it accordingly.

But I think it would matter if somehow the majors were collapsed into a single major. That would affect the results, but in a way that would deviate from the features of the marketplace that are realistic and important.

JUDGE STRICKLER: Thank you.

BY MR. WARREN:

Q. Professor, just to follow up on that thought really quickly, what if you were to add seven or eight more non-interactive services to the model? Let's say you had ten instead of two.

How would that matter in the results?

A. Well, that would create more competition in the model among them, if it was handled that way, realistically so. And the more competition there is facing one of the parties in the bargaining model, in some sense the less clout they bring to the table because that would offer different and expanded opportunities to the other side of the market, to the labels, and so that would tend, if anything, to weaken the bargaining positions of the services.

And so omitting that from my point of view is conservative.

Q. Okay. And --

JUDGE RUWE: This is Judge Ruwe. I have a question for Mr. Willig. Along with these lines of changing the number of parties in the Shapley models, if there were costs that were not represented in the fixed costs that you take from the financials, would that change, and those new costs added that would be a burden on the services, would that change the result, having another party that is not a sound recording -- a label party, be it major or independent?

THE WITNESS: Thank you, Your Honor. Good question in terms of pulling more depth out of me. I appreciate that.

The costs of the services enter into the model in different ways. One way is the marginal cost, which helps to estimate inside the model what is the impact on value if there are more or less plays being served by one of the services, more or less activity, and that will influence the overall flow of profit and of value. And so costs enter the model that way.

And then fixed costs enter into the model in terms of what's the overall ability of one of the services to be financially sustainable over the medium term, say, in terms of whether their operations are in the red or not.

And as well as being a variable cost issue, that's also a fixed cost issue. And that is something that I have modeled and is within the purview of the assessment of the Shapley Values.

JUDGE RUWE: Thank you.

BY MR. WARREN:

Q. Professor, just to follow up on that really quickly, do I take you to be saying that fixed costs and variable costs for the services both enter into your equations?

MR. MARKS: Objection, leading.

CHIEF JUDGE FEDER: Please rephrase your question, Mr. Warren.

BY MR. WARREN:

Q. That's okay, I'll -- I'll withdraw the question.

All right.

JUDGE STRICKLER: Professor Willig, I just want to make sure I understand clearly the nomenclature you were using because the question, although withdrawn, asked you about marginal costs and you had -- excuse me, you had responded to Judge Ruwe making reference to marginal costs and Mr. Warren had mentioned variable costs.

For purposes of your testimony, are you treating the phrase "variable cost" and the phrase "marginal cost" as synonymous?

THE WITNESS: Yes.

JUDGE STRICKLER: Thank you.

BY MR. WARREN:

Q. Professor, I'll ask you the non-leading version of the question to get it in the record. Does your model consider both variable costs and fixed costs?

A. Yes, it does.

Q. Very well. Thank you.

So moving on to the next part of your executive summary, what is your understanding of the statutory criteria that apply to setting a royalty rate in this proceeding?

A. Well, overarching, the standard is willing buyer/willing seller in a marketplace that is free of the regulations surrounding statutory licensing.

Q. In your view, is the Shapley Value model consistent with that criterion?

A. Yes, it is.

Q. Can you explain why.

A. Sure. So to begin with, the Shapley Value for a given party in the negotiations is built up from assessments of the ended value provided by the participation of a party in the common enterprise that -- making the negotiations necessary, an important part of -- of the business reality of the enterprise.

So when one party joins in with the others in the subset of all the parties, what's the added value provided by the participation of that party? So that's a lot of words for the simple phrase "incremental value."

The incremental value depends upon who's in the subset that the party is joining, and the Shapley Value takes all of those different incremental values, each one depending upon what the subset of the other parties is, and it averages over all of those incremental values created by the addition of the party to another subset of the other parties.

And that range of those subsets goes all the way from nobody else so that the party is, as it were, the first one to the table, all the way up to everybody else is there already, but this one party is the last one to join in. And so there's the full range of subsets to which this party is being added, and the Shapley Value looks at the incremental value provided and averages over all of those.

As a result, at least within my applications, the Shapley Value looks at all the value-creating services and charges them no more than their willingness to pay, and it also pays the record companies, the parties to the overall enterprise, no less than their opportunity costs. And that is based on what they can do on their own, and it's more formally here the compensation that a party gives up as a result of licensing their music to the services.

So that's the conceptual idea of opportunity costs. And in my model the Shapley Value exceeds or is equal to the opportunity cost, but generally it's above the opportunity cost, and in the model note is taken of the fact that the Shapley Value royalties don't exceed the willingness to pay of the parties as long as the parties are value-creating services.

Q. Professor, can you just relate that back to the willing buyer/willing standard, please? Oh, I'm sorry, Judge Strickler?

JUDGE STRICKLER: That's all right. It's always a problem here in a virtual proceeding, Mr. Warren.

Professor Willig --

THE REPORTER: I'm sorry, there is shuffling of papers going on, Your Honor.

JUDGE STRICKLER: That wasn't me. Is that better now?

THE REPORTER: Thank you. Thank you, yes, Your Honor.

JUDGE STRICKLER: Thank you. In your third -- excuse me, second sub-bullet point, you make -- you make the point that the charges value-creating services no more than their willingness to pay. But is that actually so, especially in light of, I think, the last thing you said? If opportunity cost, as calculated under the Shapley model, is greater than willingness to pay, then they, in fact, would be charged more than their willingness to pay if one relied on the Shapley Value; isn't that so?

THE WITNESS: Well, it's an interesting theoretical point because in the literature, the Shapley Value starts out with saying if the overall enterprise is value-creating, then how should that

total value be apportioned among the parties?
But if the overall enterprise that's contemplated is not value-creating, so that the opportunity costs exceed the willingness to pay, then in the Shapley world, that last deal won't be made --
JUDGE STRICKLER: It's --
THE WITNESS: -- because --
JUDGE STRICKLER: It's more than just a theoretical issue, isn't it, because don't you say -- and I don't recall whether it's in your direct testimony or in your rebuttal testimony or both -- that we may well be in a world where the opportunity cost is greater than the willingness to pay and that the service would operate -- service in your model would operate at a loss and the fact that they exist, despite the losses, may be because they don't -- they're not interested in generating a profit?
THE WITNESS: Yeah, or because they're looking at the long run, and so the losses may be viewed as temporary, which is part of why a longer run forward-looking projection is an important way to do the assessments here. Or what we see here is that the services in reality are often part of a broader business enterprise that includes other lines of business. Pandora is certainly like that. It has

been, even more so now that it has joined with SiriusXM.

And so the overall profitability might include, from the business's perspective, impact on other businesses, in which case looking through the model's lens individually at the service won't actually be predicting what would happen in reality in view of the decisions that the owner of the service might make from a broader perspective.

So it's not necessarily going to be the conclusion that in reality the service will go down. It's just the indication that the service, viewed within its own four corners, actually can't pay the record labels enough to compensate them for what their losses are from joining in, what their opportunity costs are.

JUDGE STRICKLER: So it's --

THE WITNESS: But it's not clear, and as a matter of policy, I don't think that the labels, the record companies that are providing the license to their music, certainly in the unregulated market that's the model here, shouldn't be asked to accept less than their opportunity costs, but they may voluntary do that if there's other business values to them, but they shouldn't be required to accept less than their opportunity cost.

JUDGE STRICKLER: So if I understand correctly, then, the Shapley model, which is a -- a model that is intended to generate what's considered by economists to be a fair result, is -- is sort of agnostic with regard to whether or not one side of the transaction will actually be able to consummate the transaction, depending on the values that come out, once you plug in the data to the -- to the model itself.

THE WITNESS: Well, the Shapley model says I can apportion, "I" being Shapley, who is gone, rest in peace, but the model can apportion the gains, the surplus value created by a value-creating enterprise.

And the Shapley model does indicate, well, there's this thing called opportunity cost, and if the opportunity costs exceed the willingness to pay of one of the parties, here the service, then that deal, that resulting agreement, is not sustainable within its own four corners.

And so there is no surplus value to apportion, and so the Shapley Value model can't do its job because the surplus value is not -- is not positive. But in reality, there may be other considerations, broader business considerations, that would keep such a service going in the marketplace, and validly so, because of other impacts it has on a multi-service business or because it provides some sort of a -- of a funnel to higher paying services, which is the case, I understand, importantly, for Spotify.

And so just because in the model a standalone service doesn't have enough value to exceed the opportunity cost doesn't mean that in reality there are royalties offered, equal to opportunity cost or above. It doesn't mean the service will actually be withdrawn from operation. But in the model, that would be the case because the model doesn't look at those other impacts on other elements of a multi-service business.

JUDGE STRICKLER: Thank you.

MR. WARREN: Thank you, Your Honor.

BY MR. WARREN:

Q. Professor, let's bring you back to the scenario where the overall enterprise, as you've described it, is value-creating, meaning there is a royalty to be found between the service's opportunity cost and -- I'm sorry -- the label's opportunity cost and the service's willingness to pay. Are you with me on that?

A. Yes.
Q. Okay. Can you relate us back to the willing buyer/willing seller standard and help us understand how the model meets that criterion?
A. So the model will delineate a flow of royalties based on the Shapley Values that will exceed the opportunity costs of the parties or, at the extreme, be equal to those opportunity costs, but, in general, if there is positive value generated by the enterprise, then the royalties will exceed opportunity costs because the model splits the excess value created above the opportunity costs and below the willingness to pay among the parties.
So there is an apportionment of that surplus value that includes royalties that exceed opportunity costs in the case where there's positive value created.
At the same time, the royalties that need to be paid out by the service will not exceed the willingness to pay of that party, if they are value-creating, because they, too, will get some part of the surplus value that is created.
And what Shapley speaks to is the apportionment of that surplus value among all of the parties that are participating in the enterprise.

Q. Professor, does the Shapley Value model require any sort of collusion or cooperation between the parties that's anticompetitive in nature?

A. There's no anticompetitive collusion or even anticompetitive cooperation in the way I apply Shapley Value to these negotiations. Shapley Value intrinsically does not require collusion, but the Shapley Value is about deals that are made or can be made so as to create a sustainable and gainful overall enterprise.

But that's not collusion in the anticompetitive sense at all. And my model absolutely steers clear of any such feature of the modeling. No collusion.

JUDGE STRICKLER: Professor Willig, this is Judge Strickler again.

On that point, and I know we'll get into this in more detail later on, but as to explaining the model before you can arrive at an individual party's Shapley Value, you need to be able to value the characteristic function of a coalition that precedes the arrival of that party whose Shapley Value you're measuring.

In that characteristic function, aren't there -- isn't it assumed in the model that there are deals and transactions between the parties who are in the characteristic function? In other words, for example, if we had two of the majors in that characteristic function, wouldn't they, within the provisions of the model, be permitted to engage in transactions among the -- between themselves before the arrival of the --

THE REPORTER: I'm sorry, Your Honor. Before the arrival of the --

JUDGE STRICKLER: Third major label.

THE REPORTER: Thank you.

THE WITNESS: Yeah, the way I build up the characteristic function --

THE REPORTER: I'm sorry, there's shuffling of papers.

CHIEF JUDGE FEDER: There's shuffling of papers.

THE WITNESS: Are we okay?

CHIEF JUDGE FEDER: Yeah. Please proceed.

THE WITNESS: So in my model, the way I construct the characteristic function for the various subsets is what's happening is that if there is a service, a distributor, in the coalition and there are record companies in the coalition, then what is being modeled by the characteristic function is the value that could be created by the accordance of rights to the music of the record companies on behalf of the service, the distributor, who's also in the coalition.

My model in no way represents or contemplates that the different record companies would get together and form some sort of a -- of a joint negotiating structure, some sort of cabal in an attempt to extract more value from the distributor. Instead, it's all individualistic among the labels themselves.

JUDGE STRICKLER: Isn't it -- isn't it an assumption within the Shapley Value that the coalition will maximize its value?

THE WITNESS: Yes, but within the ground rules that are built into the characteristic function about what kinds of activities and deals will be allowed for that maximization.

JUDGE STRICKLER: Where are those ground rules specified in your application of the model?

THE WITNESS: Yeah, it's in the characteristic function and in all of the -- the algebra and the numbers underlying the assessment of what value could be created by the various coalitions and the subsets.

JUDGE STRICKLER: Well, perhaps we'll get into that in more detail as we get into the characteristic function testimony in particular. So thank you for that answer, Professor.

THE WITNESS: Thank you, Your Honor.

MR. WARREN: Thank you, Your Honor.

BY MR. WARREN:

Q. Okay. And, Professor, do you want to address this last bullet here, whether the Shapley Value accords returns beyond the value that each party adds?

A. Sure. The Shapley Value is built up from the average of all the incremental values brought to the enterprise by each of the parties over all the different subsets of the other parties that are possible.

And it just averages among them in accordance with the -- the weight that different arrival orders at the table accord to those different subsets. The Shapley Value allows no returns to any of the parties above all those incremental values averaged together. And so there's no extra value beyond those incremental values.

Now, when the Shapley Value does that, it is automatically as part of its concept, taking into account the overall surplus value and distributing it, so that for a value-creating enterprise, there is a surplus value. The individual enterprise creates more value than could be accomplished by all other parties separately, without any license arrangements among them. And that's the surplus value. And that is apportioned.

But, nevertheless, the way it is apportioned is by building up those incremental values and nothing -- nothing beyond those increments.

JUDGE STRICKLER: Professor Willig, if -- if the services in your model get nothing other than their share of the incremental value, how does their model, if at all -- does your model, if at all, allow them to recover the fixed costs that are intentionally excluded when you determine the incremental values?

THE WITNESS: Sure. It has got to be from the surplus value, but all the different subsets from which the incremental values are assessed have different valuations for the party that's adding itself onto the subset.

And that means that when you add up all those incremental values, there's going to be money available beyond marginal costs, variable costs, to cover the fixed costs.

JUDGE STRICKLER: Well, there may -- going back to our previous colloquy, there may or there may not be, depending on how high those fixed costs happen to be. It may turn out this is a no deal Shapley Value result, correct?

THE WITNESS: Yeah, from the point of view of the service, that's certainly true. From the point of view of the record companies, the model recognizes that if there's no deal and they're standing alone, they'll still have the same fixed costs.

And so in the model, the fixed costs are not at issue for the record companies. They wash out, as I was saying before, when it comes to the quantification of the Shapley Value royalties, but the assumption, which I think kind of makes very basic sense, is that these record companies are assumed to be incurring fixed costs and those fixed costs are not going to be changed by what other services in these categories they are going to join.

JUDGE STRICKLER: And the record companies may be incurring -- certainly are incurring fixed costs and may be receiving super-normal profits as well, hypothetically, at least, which -- from which they can cover their -- cover -- well, beyond their fixed costs?

THE WITNESS: Yes, and they may do so, whether or not they license their music to these services that we're modeling here, from interactive services, for example, that, as you will soon see, of course pay royalties to the record companies. And that's an intrinsic part of the modeling because that goes to opportunity costs, but the model presumes that these record companies are going to be able to cover or at least stay in operation on a standalone basis or joining in with these non-interactive statutory services.

They're going to stay in business any way and, therefore, incur the fixed costs of their music operations, in any event.

JUDGE STRICKLER: Thank you.

BY MR. WARREN:

Q. Thank you, Professor.

So let's talk briefly about the empirical inputs that your Shapley Value needed. Can you briefly walk us through the steps you took to calculate opportunity cost?

A. Sure. I think -- there's multiple steps, and it's useful to focus on them somewhat separately.

The first step is to ask how many plays are lost, i.e., if we consider the comparison between the situation where the major record company does license to a non-interactive service versus where it doesn't, how many plays does that non-interactive service lose in its operations? How many plays does the inclusion of a major add to that service's operation, and so how many plays would be lost if that major were no longer part of that enterprise?

So in my primary model, I treat each of the majors as a must-have for these non-interactive services. In other words, if the major is not being licensed by the service, then that service will not be able to sustain itself in the marketplace.

JUDGE STRICKLER: Professor Willig, I -- I don't want to lose the thread on what seems important at least to me at this point, so I want to go back and -- and relate what you just said to the characteristic function.

THE WITNESS: Yes.

JUDGE STRICKLER: If you have, in your coalition, in your characteristic function, only two of the majors, and what we're -- therefore what we're trying to value is the Shapley Value of the third major, is it correct to say that the value of the characteristic function must be zero because if each major is a must-have, the value of the -- of the coalition absent one of the majors must be zero; is that correct?

THE WITNESS: Not quite, but the underlying idea is correct. If we have a coalition of some of the majors but not all, even together with the distributor, but the third major is not in the coalition, so, in the characteristic function, it's not licensing its music to the distributor, then under the must-have framework, which is my primary one, the distributor is not operating.

However, the parties who are -- the labels who are part of the coalition are still earning from outside sources of music distribution.

JUDGE STRICKLER: I'm not --

THE WITNESS: They're collecting -- pardon?

JUDGE STRICKLER: I'm not disputing that. I understand that there are opportunity costs as well satisfied by their other distribution -- their network, but this particular characteristic function doesn't have -- doesn't create any value in the -- in the non-interactive service area because it simply has no value unless all three majors are present.

THE WITNESS: That's exactly right, Your

Honor. But that also means that the characteristic function of some of the majors but not all, together with the distributor or two distributors, still has some positive assessment to it coming from the outside royalties that those record companies earn.

It's just it's not any bigger because of the enterprise, which is not sustainable with the distributor, because it's not operating, missing one of the must-have labels, but there's still value being created by that group from the outside royalties being paid to those record companies.

JUDGE STRICKLER: Well, that value existed before you ever began the Shapley analysis for these parties in the non-interactive space, because they were already, assumedly, distributing their music through the interactive services and in all other distribution methodologies?

THE WITNESS: Exactly right. And so the fall-back value, the standalone value to one of the majors, say, is not zero; it's the outside royalties that it obtains from the outside services.

And then suppose the distributor joins that coalition. There's no advancement to the characteristic function, which is what you were saying in the first place. The incremental value that a distributor brings to a coalition that has the labels already is zero under the must-have scenario, until there's enough of them to enable the distributor to start operating in a gainful way.

JUDGE STRICKLER: So if you had a coalition -- we'll just call the three majors A, B, and C. If you had a coalition of just A and B and no one else in that coalition, does that coalition have a value within the Shapley model?

THE WITNESS: The characteristic function is positive for that coalition of just A and B, and it's equal to the royalties that A and B earn from distributors outside the ambit of these negotiations.

JUDGE STRICKLER: Thank you.

MR. WARREN: Thank you, Your Honor.

BY MR. WARREN:

Q. So, Professor, we've explored this first step in your opportunity costs flow chart, if you will. What happens after you assess how many plays are lost?

A. So the next question is, of those lost plays, how many of them result in or become new plays of the label that's been blacked out or that's missing from the enterprise, new plays of that missing label elsewhere, i.e., other services?

So, for example, if there's a must-have record company and it's blacked out on the non-interactive service, what happens to all the plays that had been listened to on that service because now that service is not able to operate? I'm missing one of the must-have record companies.

So where do all those plays go and whose plays are they? Which company -- which record company has how many new plays of the music that's lost when that record company leaves the operation of the non-interactive service?

So for a blacked-out label, that's a must-have. I'm assuming in my base case that that label retains its market share when those plays divert to other services.

Q. Now, Professor, I believe in your answer you also indicated that you also need to know where these plays go. Is that its own step in the calculation?

A. That is. So how many lost plays occur, how many lost plays are recovered elsewhere by the label that's blacked out, and then where do those plays go, where do those listeners go? I call that diversion.

And in my modeling to put numbers on it, I employ the Zauberman Survey results, which speak exactly to that question to assess where the non-interactive service listeners would otherwise source their music.

Q. And having figured that out, do you then need to figure out anything else in order to reach the opportunity cost number?

A. Excuse me. Yes. A little coffee will help. The last part of this inquires how much does the blacked-out label earn from those diverted plays of its music. So after the first three steps, we know how many plays there are that divert. We know where they are go, but what kind of royalty flows do those diverted plays actually return to the blacked-out service?

And that depends upon a view, which I take on empirically, of what would be those royalty flows from alternative sources of music from the additional plays that are diverted from the blacked-out label from the service from which that distributor is leaving or failing to create the license.

Q. So, Professor, that is a helpful explanation on opportunity cost. How did you assess the distributor's willingness to pay?

A. That's derived from the profitability data that are shown in Pandora's public and SEC-filed merger proxy financial projections, and those projections that were filed publicly cover the years 2021 to 2025, particularly pertinent, of course, to our case here.

So I looked at those data that were actually submitted by Pandora itself, and used those data to assess the willingness-to-pay ceiling and also the variable profit rates of the company inside the model.

Q. So, Professor, Judge Strickler had a helpful question about this, so I just want to make sure we're clear. Your further willingness to pay is a ceiling. Is it a ceiling under all circumstances?

A. Well, under the circumstance where the opportunity cost is found to be larger than the willingness to pay, then according to the model, a standalone such service can't pay enough to create a willing seller.

In that case, the royalties should still be the opportunity cost, but it's no longer a ceiling because the opportunity cost in that case is above the willingness to pay, but the model predicts that, well, if it's a standalone service and there's no other value created by that service outside of the confines of the model, then that service is not going to be in operation.

However, in reality, it may be because it might bring additional value to either the labels or to the company that owns that distributor.

Q. Thank you, Professor.

What royalties did you derive from your Shapley Value model?

A. So the bottom line from my primary model is royalties of .0030 dollars per play for the ad-supported services and .0031 dollars per play for the subscription non-interactive services.

Q. Thank you. And --

JUDGE STRICKLER: Excuse me, Mr. Warren?

MR. WARREN: Yes, sir. Yes, Your Honor.

JUDGE STRICKLER: Are you going to be -- are you going to be getting into more questioning of Professor Willig with regard to the cost inputs that he had and also the -- his dispute with regard to the must-have nature of the -- his dispute with Professor Shapiro, with regard to the must-have nature of the majors?

MR. WARREN: Yes, Your Honor. I -- I hesitate to say this, but this is all in the nature of an executive summary, so we will be exploring all of these details in some detail throughout the course of the day, including showing the witness various pieces of evidence that speak to these points.

JUDGE STRICKLER: Thank you. I didn't want to belabor your executive summary questioning with detailed questioning if you were going to do that later, which you say you are, so thank you.

MR. WARREN: Yes. I -- I will make a downpayment on that, and if there are any questions, of course, that I don't pick up in the course of the day, then -- then by all means, please address the witness. Thank you.

JUDGE STRICKLER: Thank you.

BY MR. WARREN:

Q. Now, we're going to briefly do a summary of module 2, Professor, which you mentioned was your disputes with the services' economists. I think, out of an abundance of caution, I'd like to close the courtroom before we do that. So if we can just take a moment to make that happen, I would be grateful.

CHIEF JUDGE FEDER: Okay. We will be going into a restricted session. Will the host please cut the public feed and clear the virtual hearing room.

MR. TOTH: Stand by for restricted session.

(Whereupon, the trial proceeded in confidential session.)

O P E N   S E S S I O N

MR. TOTH: We are back live.

CHIEF JUDGE FEDER: We are returning to a public session. Mr. Warren, please proceed.

MR. WARREN: Thank you, Your Honor.

BY MR. WARREN:

Q. Now, Professor, because we're in public session, I'm going to ask you not to speak to any specific numbers, since that's confidential. But without having to do that, let's talk briefly about your calculation of the non-interactive services' willingness to pay.

Are there significant disputes between you and the services' economists over how to best do that?

A. Well, yes and no. Originally at the level of WDTs, Professor Shapiro had relied in his own modeling on historical financial data from Pandora relating to 2018, which did not purport to be projections to the period at issue in the matter at hand, whereas I had used the public merger proxy projections from Pandora applying, consciously, to 2021 to 2025.

So that seemed like a somewhat major dispute in terms of attitude toward what would be the relevant financials, but that dispute now has dissipated because Professor Shapiro has moved in his WRT to reliance on internal Pandora projections that cover not all but some of those years that are at issue in this case.

So our difference versus historicals versus projections seems to have gone away. We both seem to be in agreement that the relevant sort of financials to rely upon are projections for the rate period at question. So part of the earlier disputes have dissipated.

A lot of the disputes that seem to be more current but are not had to do with the fact that in my WDT I made use of the public merger proxy projections, but those were informative but not fully informative in terms of the granular financial data.

And from discovery, I got much more complete backup data available to me from Pandora before I wrote my WRT, and I made the requisite alterations in my quantifications in my rebuttal testimony, making use of that newly available, newly available to me, more granular data about the public merger proxy projections. And --

JUDGE STRICKLER: Professor --

THE WITNESS: -- a lot of, for example, what

Mr. Ryan criticizes me for is no longer applicable. He had access to that backup data all along, I presume. I only got access to it after my WDT, but I embraced it, adopted it, and made use of it.

So a lot of what seemed to be apparent disputes between me and the experts for the services in that regard has disappeared.

JUDGE STRICKLER: Professor Willig, this is Judge Strickler again.

I notice that you anticipated a potential lack of completeness in the data that was available to you on which you relied on page 26 of your corrected written direct testimony at note 30 and again at page -- Appendix D-3, note 7, you have the same substantive footnote where you note that the Pandora projections on which your estimates were based, and on which you made your estimates, did not contain key inputs that you used to create the -- the projections, and that, accordingly, you said the assumptions required to estimate key parameters for use in your Shapley Value analysis may need to be updated following the completion of discovery.

Did you see in discovery production by the services the information that you thought you might lack?

THE WITNESS: Yes. In between my WDT and my WRT, I received much more information from Pandora underlying its public merger proxy statement.

JUDGE STRICKLER: Let's --

THE WITNESS: And the --

JUDGE STRICKLER: Let's -- let's slice that time period a little finer. After you prepared your corrected written direct testimony and received that discovery, did you submit an amended corrected written direct testimony in writing utilizing the -- the updated material that you received in discovery?

THE WITNESS: No, I utilized the updates for my WRT and so indicated in it. And, in fact, after my WRT submission, some additional data were first made available to me also, less consequential, but, nevertheless.

JUDGE STRICKLER: Why did you elect, if indeed you did elect, not to amend your corrected written direct testimony to incorporate what you learned in discovery?

THE WITNESS: I don't recall the specific timing, to be frank. And I'm not sure about the relative timing between my use of the added data and the actual submission time or the times leading up to the submission of the WRT. So I just don't recall.

JUDGE STRICKLER: Thank you. Mr. Warren?
BY MR. WARREN:
Q. Okay, and, Professor, I apologize if this is repetitive but I'm not quite sure I did ask you this or not, but can you just briefly remind us of whether there are any disputes that have not dissipated over the course of the written case that still remain live, in your eyes, with respect to financial data from the services?
A. Yes, there are. So there's still some issues of the allocation of Pandora's costs as between its ad-supported tier and other elements of Pandora's business, and the misallocation that Professor Shapiro implements in his work, in my view, artificially depresses the expected profitability of the ad-supported tier of Pandora's lines of business.
And so that's still an area of dispute between us.
JUDGE STRICKLER: Mr. Warren, excuse me. Professor Willig, I think you addressed this question a moment ago broadly, but you did testify about the distinction between the documents, the financial projections that Pandora relied upon, and your -- you haven't called it that already -- your scenario 2 documents, on which you relied.

On page D-2 of your corrected written direct testimony, footnote 4, you say, "I understand Pandora also recently produced additional projections that it prepared for these proceedings."

How did you come to the understanding that the projections on which Pandora relied were, in fact, prepared for these proceedings?

THE WITNESS: Was that referring to the LRS?

JUDGE STRICKLER: Yes, it is. And -- and by all means, take a look at your exhibit, your corrected written direct testimony at page D-2, footnote 4. I believe it is the long run scenario, yes.

THE WITNESS: In my rebuttal, Judge?

JUDGE STRICKLER: No, it's your direct, corrected written direct.

THE WITNESS: Okay. I'll put some light on the subject. And we're on D --

JUDGE STRICKLER: D-2, page D-2. And it's footnote 4.

CHIEF JUDGE FEDER: It's page 92 of that exhibit.

THE WITNESS: 92, footnote 4. Right. So, Judge, what's your question? Sorry, I now see finally page D-2, footnote 4.

JUDGE STRICKLER: Thank you. I'm happy to repeat it.

How did you come to the understanding that Pandora had recently produced these additional projections -- well, broadly, how did you come to the conclusion that Pandora had these projections prepared for these proceedings as opposed to for some other business purpose?

THE WITNESS: Yeah. I'm not sure that that's what I had in mind with those words. Rather, that it had been produced recently relative to the timing of the submission by me, and it was produced for these proceedings, and I didn't mean, as I recall, unless there's something that I'm forgetting, which is always possible, that the LRS data were actually created just for these proceedings as opposed to produced for these hearings.

And I may have had some evidence of the specialization of the purpose, but I don't recall that now. But what I surely meant was, at least, that the production was for these hearings. And I'm well aware that LRS is something that Sirius had been preparing for its own purposes going back years, and there's testimony by Mr. Frear from Sirius about that and about what he viewed the purposes of the LRS to be for Sirius's own business purposes.

So those might be viewed as projections, but they weren't by Mr. Frear according to his testimony.

JUDGE STRICKLER: Thank you, Professor.

THE WITNESS: So I don't remember whether it was really produced specifically for these purposes, although it was produced in this case.

JUDGE STRICKLER: Thank you, Professor.

MR. WARREN: Thank you, Your Honor.

BY MR. WARREN:

Q. So moving on, Professor, could you give us --

CHIEF JUDGE FEDER: Mr. Warren?

MR. WARREN: Yes.

CHIEF JUDGE FEDER: Would this -- would this be a good stopping point to take our morning break?

MR. WARREN: Your Honor, I -- I'm just about done with the executive summary. So if we can -- if we could go two more slides, which maybe would be about five minutes, that would be a very good time to take a break.

CHIEF JUDGE FEDER: Sounds good. Please proceed.

MR. WARREN: All right. Thank you, Your Honor.

BY MR. WARREN:

Q. So, Professor, I take it there are some differences in opinion between you and the services' economists over the right bargaining model, at least you mentioned that earlier today.

Can you briefly, understanding that we're close to a break, can you briefly explain what the Nash-in-Nash bargaining solution is?

A. Well, briefly is a challenge, counsel. The Nash-in-Nash model is a model of multi-party bargaining. It's another model of that situation because Shapley is also a model of multi-party bargaining.

And Professor Shapiro asserts that that model is a better tool than Shapley Value for the purposes at hand, and he also puts forward what he calls and, hence, the quotations on the slide, the Myerson value which I think is a misnomer, and he also asserts the Myerson value, as he calls it, is a better tool than the Shapley Value for the issues at hand.

Q. As between those three tools, Nash-in-Nash -- as between the three tools, Shapley, Nash-in-Nash, Myerson, which do you think is the most appropriate for calculating rates in this proceeding?

A. In this proceeding, I think the Shapley Value is the most appropriate tool. However, the three coincide more or less, but almost the -- almost equivalent in the situation where the majors are each viewed as must-haves.

And so the dispute about the concept of the bargaining model disappears in a world where, unlike Professor Shapiro, one recognizes that the three majors are must-haves for the non-interactive services.

Q. Thank you. And just to close out our summary here before the break, did you attempt to corroborate the results of your Shapley Value model?

A. Yes, I did. That was the purpose of my sensitivity tests, in part. And the bottom line of those sensitivity tests is that they show little change from the results I obtained for the royalties from my Shapley Value approach.

In those sensitivity tests, I make use of all three of those bargaining models that we were just talking about, and I show, I think, not only that my own results are robust to these kinds of changes in the underlying assumptions, but that also Professor Shapiro's results from the Nash-in-Nash combined with his LSEs, combined with his error that

I mentioned a moment ago in terms of opportunity costs, that his approach is very, very sensitive. If only one or two of his underlying extreme assumptions were modified to make them more reasonable, then, in fact, there's an enormous magnification of the opportunity costs and the royalty levels that -- that he develops from his models.

So I find my model quite robust and his model quite sensitive, quite like a house of cards. That comes out of the sensitivity tests.

Q. All right. Very well.

MR. WARREN: Your Honors, I think this would be an appropriate time for our morning break.

CHIEF JUDGE FEDER: We will take a 15-minute recess and then reconvene.

MR. WARREN: Thank you.

(A recess was taken at 12:05 p.m. EST, after which the hearing resumed at 12:22 p.m. EST)

CHIEF JUDGE FEDER: Will the host please reestablish our public feed.

MR. SACK: Thank you, Your Honor. Standby.

MR. TOTH: We are live.

CHIEF JUDGE FEDER: Mr. Warren, we will continue. I believe we are still in public session. I can't hear you, Mr. Warren.

MR. WARREN: Thank you, Your Honor. I appreciate that.

Welcome back, Professor Willig.

BY MR. WARREN:

Q. So let's get back to our roadmap and let's start with the first topic, which is explaining the Shapley Value approach.

What problem does the Shapley Value approach try to solve?

A. It solves the problem -- can you hear me, by the way, counsel?

Q. Yes, I can.

A. Oh, good. The Shapley Value solves the problem of how to allocate among the parties the total value created when deals are reached, when agreement is formed for an enterprise, how to allocate the extra value created by that enterprise.

Q. And how do you determine each party's Shapley Value?

A. Shapley Value is built up from the incremental contributions that each party adds to the total profits created when that party is added to the subset of other parties that precede it in the arrival ordering to the metaphorical bargaining table.

So imagine there's an arrival ordering of the parties to this metaphorical bargaining table, and before a given party arrives there's already a subset of the other parties there. And perhaps they actually together create some sort of value.

And then the party arrives and the question is what's the added value that's created by that party's addition to that subset? More people. They can bring more functionality. Perhaps more value is created. And that's the incremental contribution of that party given that particular ordering of arrival.

But there's all different possible orderings of arrival and the Shapley Value doesn't fixate on any one of them. Instead it averages the incremental contributions that a party makes over all possible orderings of arrival.

Q. And once you have determined each party's Shapley Value, how do you use that information to set royalties?

A. The royalties are set equal to the amount that, after they are paid out and received, that will leave each party with its Shapley Value.

Q. So this sounds complicated. Do you see this as a purely theoretical exercise or not?

A. No, actually it does sound theoretical.

It's just the concept, but it's relatively straightforward. Sometimes it's hard work, but is relatively straightforward to apply that concept to the set of empirical values that go into the assessment of the model.

For example --

Q. Okay. Right. And I see you have an example here. So let's talk about that.

A. I do.

Q. Right. So in this example what do A and B represent?

A. So A and B are two owners of two different patents.

Q. Okay. And what is D?

A. D is the manufacturer who comes along with an idea for an enterprise, and the enterprise needs patent rights from both A and B, from both of them. And so for the operations of D, both A and B are must-haves in terms of according licenses to their patents.

Q. Can the Shapley Value approach work even if A and B in this example are not must-haves?

A. Yes.

Q. And can you explain the concept of fall-back value using this example?

A. So A and B before licensing to D or without licensing to D can earn $5 each from licensing their patents outside of this possible enterprise.

And so if they don't succeed, these parties, in reaching license deals that will allow D to operate, then A and B have $5 as their fall-back values. Without a deal, that's what they can make.

Q. Okay. And what is D's willingness to pay in your example?

A. Well, in the example, if D does acquire the license rights to both A and B, it can go to the market with those license rights in hand. And in the example it can make $16 in profits outside of -- before taking into account the royalties to A and B.

And so that $16 sets D's willingness to pay, it wants to keep as much as it can, presumably, but it can pay a total of -- and if it had to it would be willing to -- up to the $16 that it can make in profits from its market activities.

Q. Okay. Can you explain the concept of opportunity cost in terms of this example?

A. So in this example, if A and B do both come to deals with D for the license rights, and so D goes into operation, A and B can no longer earn the $5 from outside uses of their licenses as they could without D being in operation.

Instead, their outside revenues fall from 5 down to 3 for each of them. So each of them has an opportunity cost of its deals or their deals with D of 2 dollars, because they used to make 5 from the outside. That 5 would become 3 if the deals are made.

And so they're losing 2 dollars from outside by being part of the overall enterprise. So their opportunity cost is 2, each of them.

Q. Professor, sorry, why would their ability to make money from outside distributors fall in this example?

A. Well, D's operations could be competitive with the outside uses of the patents from A and B. So if D is in operation, they wind up with a smaller base of volume, perhaps, from the outside licensed operations, and that diminishes the royalty flow that they earn from those outside uses in the example from 5 down to 3.

JUDGE STRICKLER: Professor Willig, a question for you. Excuse me, Mr. Warren.

MR. WARREN: Yeah.

JUDGE STRICKLER: The phrase fall-back value, is that particular to the Shapley Value modeling or is that a concept that comes from somewhere else in economic analysis?

THE WITNESS: Thank you, Your Honor. Fall-back value comes into play in all of the wide variety of bargaining and negotiating models in modern economics. And I think the most fundamental use of it in general is from the Nash model of bargaining.

And John Nash was a genius, and Nobel Laureate, and had an unfortunate end, but his name is on lots and lots of different elements of -- of economics.

So the Nash Bargaining model is somewhat different from Nash-in-Nash, and related but different from Nash equilibrium, and so forth, but they are all properly named in honor of John Nash, who was such a creative force.

So in the Nash Bargaining model, there is only two parties. That model is confined to two parties. And the Nash Bargaining model predicts outcomes that very much rely upon fall-back value.

And so I think that's the first or the most pervasive use of that term in this area of economics. So if there is just a bilateral bargaining situation, what the parties come out of that with, according to the Nash Bargaining model, depends very sensitively on their fall-back values.

JUDGE STRICKLER: Your -- your analysis in your answer to the question seemed to read my mind as to why I asked the question, because I was familiar with the concept of fall-back value within Nash equilibrium or Nash-in-Nash modeling, but I had not seen it and didn't find it in Shapley Value modeling.

Is that because -- and correct me if this is wrong, I want to understand your use of it -- that fall-back value is being used here to be able to express the incremental cost to the labels if they go ahead and license to the non-interactive services?

THE WITNESS: It's certainly related to the opportunity cost, if that's what you mean. But I think the -- the fact that brings it all together for me is that if we think about Shapley Value in a model where there is only two parties, just two parties, then the Shapley Value for two parties is the same as the Nash Bargaining model.

So -- so, of course, fall-back value is important for both of them in exactly the same way.

JUDGE STRICKLER: You're -- you're assuming that the result will be the same -- and this is getting tangential but it's related to your answer --

you're assuming the result of a two-party bargaining situation would be the same, Nash or Shapley, assuming a split surplus exists in the Nash modeling?

THE WITNESS: Yes, and likewise in Shapley. So both of them always come to the same answer in the two-party setting. Shapley reduces to Nash bargaining with only two parties.

And I know what you mean by saying presuming equal split, but I think for Nash himself, I am very much an advocate for the idea of the equal split, not out of fairness or equity, but out of the symmetry of their roles in being part of the enterprise that requires both of them.

JUDGE STRICKLER: Well, that is tangential, as I say. I'm sure your testimony as elicited by Mr. Warren will cover how the Nash split occurs.

One last question for you about fall-back value. In keeping with your example of the patents, the patent profit for A and B would each be a profit of $5 in your fall-back value.

Now, that -- that doesn't specify whether that fall-back value that they -- they would earn comes from markets that are perfectly competitive, monopolistically competitive, oligopolistic or monopolistic in any way, that just tells us that whatever that market structure is $5 would be their profit. Correct?

THE WITNESS: Yes.

JUDGE STRICKLER: Thank you.

MR. WARREN: Thank you, Your Honor.

BY MR. WARREN:

Q. So let's take a look at how you can solve for the royalties that D would negotiate with A and B using this example.

So how do you use the Shapley Value model to answer that question?

A. Right. So this is a chart, a tableau, of how to calculate the Shapley Value, in particular for the patent holder of patent A.

So remember I talked about the order of arrival at the bargaining table. So each row of this display is based on a different order of arrival. So the first row says A, B, D, and that presumes that party A is the first to arrive, then joined by B, then joined by D.

And for each different order of arrival, there will be at the right-hand side of the table the incremental value created by the arrival of A, because it's A's Shapley Value that this table addresses, what added value does A bring to the table, which depends upon who had preceded A to the table.

Q. Okay. That's helpful.

So this chart is just for Patent Owner A?

A. Yes. So let's look at the first row, shall we? That's the first column, which shows the order of arrival.

And the yellow on my screen highlighted row says, okay, if the order of arrival is B, then D, then A, then the subset of the parties who precede A is just B and D.

The next column says, okay, so what can B and D create in total value just by themselves without A? And the answer is 5, because B and D together can't make D's enterprise work, since both A and B are each must-haves. B alone isn't enough.

So the value that B and D together create is just that 5 from the outside royalty flows to B. And D brings nothing to that party.

Q. So let's just pause on that because I know this relates to a question Judge Strickler had earlier.

So I want to be clear, the characteristic function value for this subset prior to A is not zero, it's 5; is that correct?

A. That's exactly correct because of the outside activities of B, to which in this example nothing is added by the inclusion of D because A is still missing.
Q. Okay. And then what happens once A enters the subset?
A. Well, when A arrives, now the situation is different because now the three of them with license agreements between B and D, and separately between A and D, now D can operate in the market and it can bring in $16 in this example of profit, but now A and B are still adding in to the pool what they can make from their outside sources, which is no longer 5. It's down to 3, I think. Right? Yep, 3.
And so 16 from D's operation, 3 from A makes it 19. 3 from B makes it 22. So the characteristic function, the total value created by A, B, and D is $22.
Q. Okay. So what is A's incremental value in that subset?
A. So when A joined, the total became 22. Before A joined, the total was only 5. And so A brings a full $17 of incremental value in this order of arrival.
Q. What does the last row of this chart depict?

A. The very bottom. So the very bottom is the average of the incremental values brought to the table by A over all the different orders of arrival. And that number is 9, well less than the 17, notice.

Q. Why is it so much less?

A. It's so much less because most of the rows don't have A arriving last, and enabling the operations of D to go forward.

Instead, the incremental values of A are typically, in this example, only 5 because when the distributor is not operating and A arrives at the table, all that A adds to the total value is what it gets from the outside.

And so usually among all these orderings, that incremental value of A is 5. When A is the linchpin, then that value is up at 17. But the 17 gets averaged in with the 5, so the bottom line is only 9.

Q. Just to relate this to Judge Strickler's questions from a few moments ago, I believe you were just referencing the first two rows where A arrives last but the characteristic function is only 5.

Is that what you were talking about?

A. When A arrives last and the prior subset is just B or just D?

Q. Well, looking at the first row, for example, in a situation where A arrives and it is all alone, the $5 of that characteristic function value, is that its fall-back value?

A. Yes.

Q. Okay. So we have done this tableau for A. Is it also possible to do the same work for B and for D?

A. Yes, exactly the same concept of the tableau makes sense for B, and it also makes sense for D. The numbers will be different.

A and B are symmetric here, but D would have different numbers, but still the same sequence of steps and the same calculation of the average of the incremental values of that party. It's different for D, from A and B.

Q. Now, at this point you have computed the Shapley Value for all three parties. And -- well, before we go on, just tell us what those are.

A. Right. So it's 9 for A and it's also 9 for B, and the Shapley Value for D is 4.

Q. Okay. How do you use those Shapley Values to determine the royalty that D should pay to A?

A. So what A needs to get from D to attain its Shapley Value is -- let's figure it together --

there's 9 that is its Shapley Value, and it's making 3 from outside sources, and so it needs royalties of 6 to bring the 3 up to the 9.

So A needs to receive royalties of 6 to reach its Shapley Value.

Q. And does it work the same way for B?

A. Exactly the same for B because they are symmetric here.

Q. So what's left over for D if it pays 6 to A and 6 for B?

A. So D is earning 16 from the market. It's out 6. It's out another 6 in royalties. So 16 less the 12 leaves it with its Shapley Value of 4.

Part of the math of Shapley Value is that it works, that when you figure royalties this way, then the amount of royalties that the Shapley Value tells you needs to be paid out by those who are earning the money from the market, D here, actually comes out just right in terms of the totality of royalties that it needs to pay to the input contributors to reach them to their Shapley Values, taking into account what they earn from outside.

Q. So is the royalty rate set by the Shapley Value higher than the opportunity cost for each of A and B?

A. Well, let's see, the opportunity costs we said for each of them were 2, because the 5 they could make on their own fell to outside flow of 3, when D is in operation.

So each of them had to give up 2 dollars in outside revenue from the operation of the joint enterprise.

So each of them has an opportunity cost of 2, but they are each getting royalties that make up for that and more. The royalties --

Q. What if you set -- sorry. I'm sorry, Professor. What if you set the royalty at 1 dollar for A and 1 dollar for B, would the patent owners take that deal?

A. No, we would not have willing licensors then. Licensees? Neither A nor B would be willing to accord licenses to their patents if the royalty from doing so were only 1, because it costs them 2 to do that in lost outside revenue. Their opportunity costs are 2.

And so if the royalties are below opportunity costs, they are not willing sellers of the rights to their patents.

JUDGE STRICKLER: Mr. -- Mr. Warren, excuse me.

MR. WARREN: Yes, Your Honor.

JUDGE STRICKLER: Mr. Warren, I have the benefit of getting the physical copy of the demonstratives. And on page 16, as I have it, there are five bullet points, not two.

Is there -- was there a reordering of pages or were bullet points deleted for this visual demonstrative?

MR. WARREN: Your Honor, we're just kind of continuing to work through the slide. And as I animate it more bullets will appear. So that probably explains the discrepancy.

JUDGE STRICKLER: That may well be. Will you be having displayed a bullet point that says "no payment for holdout market power"?

MR. WARREN: Yes.

JUDGE STRICKLER: I will await you getting to that point then. Go ahead. I'm sorry.

MR. WARREN: Very well. Yes, the demonstrative on the screen should be identical to what you received, but obviously we have the benefit of it being animated, so there will be some differences on account of that.

JUDGE STRICKLER: Understood.

BY MR. WARREN:

Q. Thank you. Now, Professor, are you aware of any disagreement among economists on the point you just made related to whether a licensor would take a royalty that is below their opportunity cost?

A. I think there is common agreement among economists to that.

Q. Why does the Shapley Value approach give the licensors more than their opportunity cost?

A. In this example there is total value, net value or what we call surplus value created by the overall enterprise.

So the parties alone can earn from their fall-back values a total of 10. But when the enterprise is operating, the total value created is 22, as I recall. It was the 16 and then the outside values of the patent holders was each 3, so 16, 3, 3 is the 22.

Without the enterprise, the total value created is 10. So the surplus value was 12. And that's the total value created by this complex of the license agreements. That's a surplus value of 12.

And in this example, each of the three parties, A, B, and D, is essential to that overall deal, set of deals.

And so the 12 is split equally among the three parties. 12 three ways is four. And so what the Shapley Value does is it accords to each of the necessary parties their split of the surplus value, and that adds onto their fall-backs.

So just to complete that thought, the fall-back value for A was 5. And when what's added onto that is its share of the surplus, which was 4, the net for A is 9, which is its Shapley Value.

And, likewise, for B, D's fall-back in this example, it's just an example, D's fall-back is zero. It's not in any other business related to this one in this example, so its fall-back is just zero.

And when it receives its even share of the surplus value, it winds up with -- with zero fall-back, plus 4, so its Shapley Value is 4.

And that's exactly what the math, adding up all those incremental values, creates. And it makes perfectly good sense from the point of view of understanding the granularity of what's going on in the example.

Q. Now, let's say you set the royalty at 9 for A and 9 for B, which is 18 in total. Would D take that deal?

A. D would not be willing to take that deal because the royalties that that deal would entail would exceed its willingness to pay.

Q. And are you aware of any disagreement among economists on that point?

A. No.

Q. Does the Shapley Value approach contemplate A and B colluding together to drive up the royalty rates?

A. No. There's no collusion in this Shapley Value.

Q. So in what way does the Shapley Value approach credit A and B for their status as must-have licensors?

A. So A and B are each must-haves, just by the construction of this example. And one might think, therefore, that they have, I don't know, to coin a phrase, holdout market power, if they refuse to play, then somehow they might be able to hold out for the impact of their holding out on everybody else.

This model, Shapley Value, does credit the actual value they bring to the table. So each patent is necessary and it does create value. And that's absolutely one of the increments that shows up as part of the Shapley Value. It is the actual value that they bring to the table.

It's not an expression of market power in the anticompetitive sense, the antitrust sense, in the abusive sense. It's just the extra value that their participation does create.

But in the Shapley Value, that extra value they bring to the table when they are the last to arrive, if they are necessary to create the operations of D, gets averaged in with all of the other orders of arrival where they are not really essential to doing very much because all they add to the party was their outside royalty payments of 5, if you remember the example.

JUDGE STRICKLER: Professor Willig -- excuse me, Mr. Warren -- Professor Willig, I don't know if we can give you credit for the coinage, as you suggested, for the phrase holdout market power because I think we've seen it before certainly in our proceedings.

But let me ask you, do you distinguish a difference between holdout power as a form of market power and other forms of market power?

THE WITNESS: You know, there is an endless semantic debate in industrial organization economics, and maybe even in the legalisms of antitrust and competition policy, whether market power is somehow expansive of or reliant on anticompetitive forces, whether it's just an expression of the value that a party in the market brings because of its superior technology or superior efforts or business acumen.

In this example, and in my own modeling, the change in the value that's created by one of these parties when they join in is the actual value that they add, the actual value. It's not expanded by some sort of threat power. It's not expanded by any collusion, nothing anticompetitive. It's just the true change in value that their participation enables. So --

JUDGE STRICKLER: I understand that. I understand that. I appreciate that answer.

My question is not so much focused on how the -- how the Shapley Value rewards contributions and prevents holdouts.

My question, again, is whether or not there are other kinds of market power, such as complementary oligopoly power or straight out monopoly power, again, not in a pejorative sense certainly with regard to monopoly power, not to say that it's not earned, it's not the result of efficiencies, what have you, but isn't there -- is there a difference between holdout power in the market and other sources of market power?

THE WITNESS: Here -- and if I am not responsive, I welcome another try from me -- here to the extent that the contribution that A could bring to the table, or B, is part of its incremental value, and it's blended in with all of the other elements of who is bringing value to the table through the Shapley Value, and also through the Nash Bargaining model, if that's what we were using with only two players.

So it's not collusive market power. It's -- they are not holding out in some sort of strategic sense, which might, you know, in some frameworks be thought to be profitable, but that's not what's going on in Shapley Valuation.

JUDGE STRICKLER: Let's bring back in the Shapley configuration. If the Shapley Value for each side of the market in the aggregate on the licensor's side or the licensee's side and individually the licensors and licensees change, could you change the number of licensors and the number of licensees?

THE WITNESS: It might very well.

JUDGE STRICKLER: It might or it usually will?

THE WITNESS: Oh, it depends upon the circumstance. For example, here I amalgamated all of the Indies. And if I had instead modeled there to be ten different independents, each of which contributed to the total value in accordance with the music that it brings to the table, it wouldn't have changed the answer in terms of the royalties paid to the majors or the co-royalty obligations of the distributors.

So I deliberately modeled the Indies as an amalgam. But by doing that I didn't change the answer. On the other hand, if there were only -- sorry.

JUDGE STRICKLER: I'm sorry, sir. It didn't change the answer at all or only gave the Indies slightly more, a slightly higher Shapley Value?

THE WITNESS: I think the way in my primary model that I did it, it doesn't change the answer at all.

JUDGE STRICKLER: Because of a rounding issue or does it change it directionally at all?

THE WITNESS: No, I don't think it changes it at all, because each one would bring to the valuation a number of dollars proportional to the market share of the music whose licenses are owned by that particular independent.

JUDGE STRICKLER: If -- because these, the majors are understood by you to be -- by us in Web IV to be must-haves, do you understand this to be a complementary oligopoly market?

THE WITNESS: Well, in the modeling each one in the must-have scenario brings a big advance in value if everybody else is already there, kind of waiting for the completion of the full library of music necessary to sustain the service.

So, yeah, each one of them is a must-have. In that sense, you might say they are complements, but they are also competing like crazy to be the ones to create that degree of value.

They are competing like crazy in the marketplace to be the record companies that have the rights to the big hits and the best selling artists. And their success in that regard is what makes them must-haves.

So they are complements in the sense they are both needed as must-haves to make the service sustainable. But in the market, what is allowing them to be that valuable is their competition among each other for the success of the music whose rights are being negotiated here.

JUDGE STRICKLER: And how would that success translate into higher revenues and profits?

THE WITNESS: So --

JUDGE STRICKLER: In the interactive market.

THE WITNESS: In the non-interactive market?

JUDGE STRICKLER: No, I'm asking in the interactive market, actually.

THE WITNESS: Oh. Well, there, too, I think it's generally acknowledged that they are must-haves. Of course they face in the interactive market a great deal of financial power and importance on the part of the services themselves, because that's how the majors earn their money or the majority of their money these days.

And so they do bring their value to the table, but also a paid Spotify service or an Apple Music brings their own power to the table as well. So you might say they all have market power because they are all very important, but it doesn't enable them to exploit it in an excessive way beyond what the value actually is.

JUDGE STRICKLER: In your Shapley Value model, if you had taken these three must-haves and collapsed them into one monopoly offering sound recordings to the non-interactive services, how would that collapsing of the number of licensors, major licensors from 3 to 1, have impacted the value, the Shapley Value of the licensor side?

THE WITNESS: Well, I think in two different ways. If there really were only one label or if the three of them were somehow colluding, which certainly doesn't occur in -- in my modeling, it's true there would be fewer parties among which to split the surplus value.

And so that would affect the answer because, as we saw in the example -- and this is a general characteristic of Shapley Value or any marketing model, the surplus value is split among the parties, so if there is fewer parties then there is more of a split for each one.

That's just the first effect, though, because the second effect of what you're asking me about is not in my modeling at all, and it's really in some sense, too, beyond the inputs that are available to me. And I wouldn't have done it because it's not a practical question.

But if there were only one label, it wouldn't really, I think, be as successful in bringing audiences as the three major labels and the independents are in reality as reflected in the model, because, after all, it's the competition among the record companies that makes them so good and makes them invest so much and work so hard to bring in the talent that attracts the listeners, that builds the audience for all of the modes of distribution, including the non-interactives that we're modeling here.

So if one were to attempt to replace this model or this view of the marketplace with an alternative, where there is a monopoly label, yeah, the split would change, but also the size of the pie, I think predictably, would be much shrunken because the label, the monopoly label wouldn't be nearly as good or be nearly as motivated as the competition among the labels actually is in terms of creating music that builds the audience.

JUDGE STRICKLER: Thank you, Professor.

BY MR. WARREN:

Q. And, Professor --

CHIEF JUDGE FEDER: Excuse me. Excuse me, Mr. Warren. Judge Ruwe, did you have a question?

JUDGE RUWE: No. Thank you for posing that, though.

CHIEF JUDGE FEDER: Okay. Please proceed.

MR. WARREN: Thank you, Your Honor.

BY MR. WARREN:

Q. Professor, let's just take the slides a little out of order, since this one builds on Judge

Strickler's questions directly.

So just remind us what parties did you represent in your Shapley Value model?

A. Yes. So there is four record companies in the model, three real ones, Universal, Sony, and Warner, and also my amalgam, which I just called the Indies.

And I have separated out the majors from each other to account for their different positions, since they have different market shares, and the Indies are not assumed by me to be collectively, although they don't operate collectively in this model, it's just sewing them together, they're not even collectively a must-have the way I modeled them.

When I say collectively, I worry about that word because it's not that there's some sort of a cartel among the Indies. I am just sewing them together for the sake of the model into an amalgam.

And on the service side, there's two representative distributors, one ad-supported service and a separate subscription service. And in the model they don't share ownership. They don't care about each others' profits, they're separate, just as far as the model is concerned.

JUDGE STRICKLER: Professor Willig --

BY MR. WARREN:

Q. Also, did you --

JUDGE STRICKLER: Excuse me, Mr. Warren. I'm sorry.

MR. WARREN: Yes.

JUDGE STRICKLER: Without using numbers, because I try to do this without having to go into restricted session, do you have an understanding as to what the total market share is of the Indies as a collective, as you collectivized them for purposes of your model, compared to Warner, for example, with regard to sound recordings played on non-interactive services?

THE WITNESS: I forget the actual numbers, sorry to say, Your Honor. The collective Indies are sizeable in the model. I don't think they reach the share of Universal, but they are not de minimis as a totality. That's for sure.

JUDGE STRICKLER: On the assumption -- and I don't know this is so -- on the assumption that the Indies as collectivized had a total share of sound recordings played on non-interactive services greater than Warner, would that make collectivizing them a distortionary effect in your model?

THE WITNESS: Well, so first of all, no.

The answer is I don't collectivize them, except notionally, and I don't treat them in their totality as a must-have because I know that what I'm modeling, that's really the attractability of the analytics, what I'm modeling is their aggregation without assuming that they all together would be making the same decision in some sort of a collusive way.

They are not doing that in my model, even though I do aggregate them together. And so the fact that their total share might be comparable or even larger than Warner's doesn't give them a must-have status the way Warner has for that analytic purpose.

The other reason is that must-have status is not just a matter, as I know you know, of market share. It's not just the numbers of market share. It's really -- it's about the hits and how essential is the library that they bring to bear through their licensing, how essential is that to the attentiveness of the audience and the appeal that the service has to the audience.

And so it's not just market share. It's really the hits that they bring and make available to the service. And in that respect, even the total market share of the Indies overstates their role in -- in bringing hits to the table of a distribution service.

JUDGE STRICKLER: Thank you.

JUDGE RUWE: Professor Willig, I have a question. So I'm understanding this, this notion of the amalgam, to mean even if number 4 in here was -- was exploded into being hundreds or thousands of individual record companies, that the result would be the same. Correct?

THE WITNESS: Yes.

JUDGE RUWE: Okay. If a subset of number 4 was viewed to be must-have because of hits, would that change the modeling?

THE WITNESS: If -- if that subset was to be viewed as acting collectively or collusively.

JUDGE RUWE: Or any party -- or just one small set within it, one, one record company within that -- within number 4, within that subset that was viewed to have must-have status.

THE WITNESS: Yeah, if there were one company that were understood to be a company and so there is no issues of collusion between companies, just one company, albeit with a small market share, but who was a must-have for whatever reason, yeah, that would be something different from what I have built into this amalgam of the Indies.

JUDGE RUWE: And presumably the same would hold true if there was, again, another one and another one within that, even with small market share, but, as you are suggesting, the must-have status is based on the -- I'm not getting into why, whether something is must-have status -- but if the must-have status comes not from market share but from hit, the ownership of hits, then there could be additional must-have categories within a broken out number 4 and each additional one would change the result of the modeling?

THE WITNESS: If I am understanding you, I think that's right, that the -- the number and the population of parties in the negotiation that are each viewed as must-haves would affect the answer.

JUDGE RUWE: Thank you.

BY MR. WARREN:

Q. And, Professor, just to follow up on that line of questioning, are you aware of any of the economists in this proceeding positing that any of the Indie record companies are must-have?

A. No, I haven't seen that from any of the economists in this matter in terms of their testimony or the analytics they are bringing to bear.

Q. And are you aware of having seen any

evidence indicating to you that any of the independent record labels are must-have?

A. I have not.

Q. Now, you were talking about the two distributors that you modeled. I want to ask you whether you separately modeled a simulcast service?

A. Not separately, no. The simulcasters are -- I'm getting all these messages on my screen -- the simulcasters are within the overarching category of ad-supported services. So they are included in that category, but they are not broken out separately.

Q. And, Professor, I just want to make clear, and we should have said this at the outset, that if you can just close out your e-mail, I know that e-mail just pops up, but just please close out of everything while you're testifying. That would be -- that would be appreciated, I think, by all parties.

A. That would be smart.

Q. Now -- and you can take a second to do that, but let me pose the question.

Why didn't you separately model a simulcasting service?

A. Well, I understand that in Web IV the Judges decided to analyze and proffer and decide on rates that would apply to all the ad-supported services, whether they be something like free Pandora or like a simulcaster.

There was some back and forth on that subject in Web IV, but the Judges did decide that there would be a single rate applied across that entire category of service.

And I asked myself whether there would have been changes in the market that I'm aware of that would today lead to a different conclusion on that subject. And I'm just not aware of any such changes.

So I went with the precedent from Web IV.

Q. Professor, how many parties, if you can remember, did Professor Shapiro represent in his model?

A. You're right, I can't remember that. There's a bunch of different independents treated separately from each other, along with the three majors, in his bargaining model.

Q. And how many distributors did he model?

A. Well, actually, he is kind of down to just the ad-supported service, on the one hand, and a subscription non-interactive service on the other hand.

And what he didn't do is model them together in one bargaining framework in a way that, I think, understates the competition that exists in the market between those two categories of services.

Whereas in my modeling, I took pains, as you can see, because within the bargaining model there are separate players, separate negotiators, one reflecting the ad-supported services as a representative, as a proxy, and another for the subscription non-interactive services.

And their businesses are interacting inside the model because there is substitution between them for audience. And that does affect the answer.

JUDGE STRICKLER: Professor Willig, how did you come to the conclusion that the ad-supported and subscription services are substitutes for each other and, therefore, are in competition with one another?

THE WITNESS: From the surveys. All of the surveys from all of the parties are asking about diversion, and they're all showing diversion from ad-supported to subscription and subscription back to ad-supported, depending upon which service is being removed from the services available to the -- to the listeners, to the audiences.

So the survey said, yeah, there is diversion in that substitution.

JUDGE STRICKLER: Did you consider whether or not there was a divergence in the willingness to pay of those who are using ad-supported services versus those who subscribe to subscription services?

THE WITNESS: You mean difference in willingness to pay on the part of the users?

JUDGE STRICKLER: Yes, the downstream users and subscribers.

THE WITNESS: Yeah, so, I mean, ad-supported is the willingness to listen and bear whatever burden there is of the ads.

For the subscription services, I took their prices to their own audiences as given, but actually that doesn't come into the valuation, into the Shapley Values.

What does come in is the royalties from the different kinds of services. And there I based the royalties from the interactive services on reality, whatever they were. And those come in to the opportunity costs. But I took those elements of opportunity costs from the market data as they are.

JUDGE STRICKLER: So there were other services -- withdrawn. Thank you, Professor.

MR. WARREN: Thank you, Professor.

Thank you, Your Honor.

BY MR. WARREN:

Q. Professor, let's, just because we skipped it, let's move back one slide quickly. And I notice you have the statutory standard up on the screen.

In what way in your view does the Shapley Value approach speak to the standard?

A. Not being a lawyer, although I have spent a lot of time with lawyers, but I am not a lawyer, I read this as -- as the words do state, but I do think and I understand, I think, what they are trying to say with these statutes in terms of this language, and so substitution comes into play here in the statutory language and the idea of opportunity cost and all the diversions that are modeled by me in the Shapley Value framework or in other frameworks as well go directly to issues of substitution.

So when a record company licenses its works to a distribution service, then inside the analysis is the idea that, well, that may be substituting for the use of those same music rights by other services and, therefore, have an impact on the royalties received by that record company from other sources.

And so the idea of substitution is squarely covered by the modeling through both fall-back value, which is based on outside royalties, and opportunity cost, which is based on substitution across the services in terms of what the license rights can actually accomplish.

Q. Professor, I take it --

MR. WETZEL: Excuse me. Excuse me, counsel. This is Joe Wetzel from Latham & Watkins on behalf of NAB.

I just want to make sure that we're set on an important issue that came up a few moments ago.

I want to make sure that Professor Willig has turned off all messaging and e-mail programs on his setup so that his monitor is not displaying external messaging services. That's part of the pretrial order that we agreed to on June 10th.

MR. WARREN: Yes. And, Mr. Wetzel, of course we fully agree with that.

BY MR. WARREN:

Q. Professor, can you please confirm that you have it closed out of any messaging programs?

A. There is nothing on my -- I'm sorry. There is nothing on my screen except you, actually, counsel, and the demonstrative and a lot of little notations coming from Zoom that I'm used to.

What did pop up was not e-mail but some sort of message about, I think maybe it came from this proceeding, some sort of notice that lunch is coming or something. I don't know. But it certainly wasn't about the content at issue here.

Q. All right. Very well.

MR. WARREN: And, Mr. Wetzel, we will discuss including in our pretrial -- in our proceedings protocol some sort of notification to the witness after they are sworn in to ensure that we don't inadvertently run into this issue again.

MR. WETZEL: Thank you, counsel.

MR. WARREN: Yeah, of course.

BY MR. WARREN:

Q. Now, Professor, just to bring you back to the slide here, I take it you were just looking at the statutory standard in the first bullet, and I will just read that for purposes of the record, 17 U.S.C. 114(f)(2)(B)(1).

Now, I notice here that the statutory standard doesn't just mention substitution. It also seems to mention promotion insofar as it says: "The Judges shall base their decision on whether non-interactive distributors may promote the sales of Phonorecords or otherwise ... may enhance the sound recording copyright owner's other streams of revenue."

Did you consider that part of the standard;

did you look at promotion?
A. I did. I built a model and I linked it to the data of the force, which I understand could be important and is important in some parts of these markets, for where an audience to, say, a free non-interactive service actually acts as a funnel for membership in, say, a subscription non-interactive or interactive service, which will be more lucrative for the record companies.
And in that respect might be a promotion of sales of rights, in any event, more royalties, thereby enhancing the copyright owner's other streams of revenue.
So one phrase for that is up-selling or another phrase is conversion. But it is promoting additional sources of revenue back to the copyright owner. So I think those kinds of effects are responsive to your question, counsel, but also to the statutory language as I understand it.
What I did is did a dynamic Shapley Value model where the interactions over time are actually elaborated in the model, allowing for the possibility that --
CHIEF JUDGE FEDER: Excuse me, Professor. We have an objection.

MR. MARKS: Yes. Objection, Your Honor. Could we get a reference to where this is disclosed in either his written direct testimony or written rebuttal testimony?

MR. WARREN: Yes, Mr. Marks.

MR. MARKS: If it's a previously disclosed analysis, I will withdraw the objection. But if it hasn't been previously disclosed, then I object as new analysis.

MR. WARREN: Yes, Mr. Marks. It is previously disclosed. It's at Footnote 33 of the witness' corrected written direct testimony.

MR. MARKS: Thank you.

CHIEF JUDGE FEDER: What -- what page is that on?

MR. WARREN: I beg your indulgence, Your Honor, while I look that up.

JUDGE STRICKLER: Footnote 33 is on exhibit page 30, of 137, page 28, I believe.

MR. WARREN: Thank you, Judge Strickler. That's exactly right. Page 30 of the PDF of the corrected written direct testimony.

So, Mr. Marks, you anticipated my next question to the witness.

BY MR. WARREN:

Q. Professor, did you talk about that model in your written direct testimony?

A. I did.

Q. And what did you conclude from that analysis?

A. Oh, I concluded that when I model it, based on the data from Pandora's operations, that there is some very small degree of up-selling of conversion in the Pandora data and those data are the merger proxy projections out to '21 to '25.

It's a rather small amount of conversion. And when I build that value of those conversions into my Shapley Value, it affects the royalties that result from the modeling a tiny amount, less than 1 percent, as I remember it, of what those royalties or otherwise calculated to be by the Shapley Value.

So I took it into account and I found that it had a de minimis effect on the bottom line royalties calculated the same way, assessed the same way that I assessed those royalties without taking conversion into account.

JUDGE STRICKLER: Professor Willig, this is Judge Strickler. Excuse me, Mr. Warren.

Without disclosing the conversion ratio that you found, you said it was rather small for Pandora.

Do you have that number, that percentage of conversion anywhere in your report, either the appendix or in any other backup documents that are exhibits here?

THE WITNESS: Yeah. As I recall, the entire modeling and the empirical inputs to that modeling are part of the backup to my WDT corrected.

JUDGE STRICKLER: In the backup. And do you know or, Mr. Warren, do you know whether or not that backup material is, in fact, part of exhibits in this proceeding?

MR. WARREN: Your Honor, I do not know the answer to that question. But during our lunch break, I can certainly investigate whether it shows up in the exhibits.

And, if it doesn't, we would be happy to -- to proffer that as an exhibit so that it lands in the record.

JUDGE STRICKLER: Subject to any objections that the parties may have to a late document or, sorry, the proffering.

Another question, Professor Willig. When you talked about a relatively small conversion by Pandora, as you recall were you referring to conversion by Pandora ad-supported to Pandora subscription or Pandora ad-supported to any subscription non-interactive service or any interactive service, for that matter?

THE WITNESS: What was in the model was conversion from ad-supported free Pandora to Pandora Plus and Pandora Premium.

JUDGE STRICKLER: Thank you.

BY MR. WARREN:

Q. Now, Professor, I take it that the up-selling or funneling that you just described is applicable to a non-interactive service like Pandora Free. Is that correct?

A. That's what I modeled that I was just describing, yes.

Q. Okay. And let's talk then about simulcasters. Dr. Leonard, the economist for the NAB, says that simulcasters are promotional because they are just a digital transmission of over-the-air broadcasts and those are commonly viewed as promotional.

Do you agree with that?

A. I do not agree with the proposition put forward that the promotional value of the appearance of music on AM/FM broadcast mode of distribution is an apt analogy to promotional value for simulcasting.

I don't agree with that equivalence.

Q. Why is that?

A. AM/FM broadcast --

MR. WETZEL: Objection, Your Honor. This is Joe Wetzel from Latham for NAB. I don't believe that any of this analysis appears in Dr. Willig's written testimony.

CHIEF JUDGE FEDER: Mr. Warren, can you point to anywhere in his written testimony where this is discussed?

MR. WARREN: Your Honors, I am not sure if I can. I think this is more responsive to an argument that was advanced in the openings yesterday that Professor Willig attended. So I don't know if there is a direct reference to this in the -- in the testimony. I am happy to go look and refresh my own recollection on that.

CHIEF JUDGE FEDER: Okay. You can do that during the -- during the lunch break.

I would like to take a brief moment to -- actually, why don't we break for lunch now, and I ask my colleagues to jump on to a Skype call with me. So we will stand in recess for one hour for lunch, and reconvene at the end of that.

MR. WARREN: Thank you, Your Honor.

(Whereupon, at 1:24 p.m. EST, a lunch recess was taken.)

AFTERNOON SESSION

(2:25 p.m. EST)

CHIEF JUDGE FEDER: Will the host please start the proceeding?

MR. SACK: Thank you, Your Honor. Stand by, please.

MR. TOTH: We are live.

CHIEF JUDGE FEDER: Okay. There, we have reconvened in public session for the afternoon. The witness is still Professor Willig, and we have an objection.

Now, the -- the ground rules for these proceedings, generally we have permitted a certain degree of surrebuttal by a -- by an expert witness to -- you know, which by definition means addressing matters that were raised in the rebuttal of another -- of another witness.

Now, the particular testimony that took place before the lunch break seems to me to be linked to the views that Dr. Willig expressed in paragraph 93 and footnote 158 of his written rebuttal testimony, so to that extent, it does not appear to -- to the Judges to have gone beyond the witness' written rebuttal testimony.

However, if we are to continue with this line of testimony, Mr. Warren will have to identify what -- to tie this into something in the rebuttal testimony of the NAB witnesses, if we're going to consider this to be permissible surrebuttal. Otherwise, we'll have to cut off this line of testimony.

Do my colleagues have anything further to add to that?

JUDGE STRICKLER: No, I don't. I know Mr. Warren was going to be attempting to identify portions of the transcript -- the written testimony that -- upon which he was relying, so I certainly am willing -- I personally am willing to hear him.

MR. WARREN: Thank you, Your Honor. That actually was the same portion that we were going to identify. So Chief Judge Feder has beaten me to it. I don't have a further line of questioning on this topic, but I do believe that Mr. Wetzel's objection came in the middle of the witness' answer, so I would just ask Your Honors' indulgence to allow the witness to finish his answer to the question that had been posed. If that's --

MR. WETZEL: Excuse me, Your Honors, may -- may I respond?

CHIEF JUDGE FEDER: Please.

MR. WETZEL: So one point I wanted to raise is that I don't believe that this testimony falls in the category of surrebuttal because these are issues that were raised by Dr. Leonard in his written direct statement.

And so to the extent that Dr. Willig is testifying based on his rebuttal report, I think he should be limited to the sum and substance of that footnote 158, which is -- which is all that he has given in response to Dr. Leonard raising those issues in the direct case.

And I -- and I just would point out that this footnote includes two statements from a Universal Music witness, followed by a question posited by Dr. Willig, and -- and that Dr. Willig subsequently admitted at his deposition that he performed no analysis of the -- the relative promotional value of the services in this proceeding.

And, you know, I'd be happy to go on further, but I just -- I think we'll be okay, subject to Your Honor's admonition, but I just wanted to clarify that this was not a point raised by Dr. Leonard in his rebuttal for the first time.

MR. WARREN: Your Honors, may I respond to that?

CHIEF JUDGE FEDER: Yes.

MR. WARREN: Thank you, so as an initial matter, I believe that Mr. Wetzel's attempts to introduce Professor Willig's deposition testimony into the colloquy is inappropriate. And I would have other responses about what analysis Dr. Leonard did or didn't do about promotion to respond to that point, but I don't think that's what we should get into.

As to the footnote, I think this is exactly what the witness was about to testify about. The question I had posed to him is why he did not think that there was any added promotional benefit to simulcast, and the footnote contains some of the evidence that the witness considered that speaks to that very point.

CHIEF JUDGE FEDER: And one further point that I would note is that the -- the evidence that is cited to in that footnote is restricted. So if we are going to get into any discussion of that language, we will have to go into restricted session.

MR. WARREN: Your Honors, I think we can maybe square the circle here, and I would just direct the witness to that portion of his testimony, ask him to maybe identify whether that testimony is what supports his conclusion, and then we can perhaps leave it at that, since the quotations are already in the record. Would that work for your purposes?

CHIEF JUDGE FEDER: That would work for our purposes. Professor Willig?

THE WITNESS: Yeah, you're watching me look at that footnote, if that's appropriate.

CHIEF JUDGE FEDER: Yes. It's --

MR. WARREN: Well, let me put --

CHIEF JUDGE FEDER: Mr. Warren, are you going to put that up on the screen?

MR. WARREN: Yes, we can certainly do that. So this would be page 61 of the PDF of the witness' written rebuttal testimony. I'm just gesturing to our trial technician here to get that up.

BY MR. WARREN:

Q. Now, Professor Willig, before the break, I had asked you whether you had considered Dr. Leonard's argument that simulcast --

MR. WETZEL: Excuse me, Your Honors, is -- is this screen share on the public feed?

CHIEF JUDGE FEDER: No. The public feed is audio only for this very reason.

MR. WETZEL: I see. Thank you.

BY MR. WARREN:

Q. Okay. Now, let me start again. Before the break, Professor, I had asked you about Dr. Leonard's argument that simulcasters are promotional because they're just a digital transmission of over-the-air broadcasts and those are commonly viewed as promotional.

Did you address this issue in your written testimony?

A. Yes, I did.

Q. And do you agree with Dr. Leonard's argument?

A. I do not.

Q. And if you can explain the basis for your disagreement without actually quoting this testimony, please do so.

A. Good. I -- I won't quote this testimony, because it's confidential. Is that --

Q. Yes, sir.

A. Okay, good. So, in general, we all understand, and I think the general record makes it clear, that the volume of plays on simulcasting is very small relative to the volume of plays in the broadcast arena, and so that itself immediately unbalances the two, so it's kind of suspect as a matter of economic logic and business logic as well, to somehow make equivalent any promotional effects from over-the-air broadcasts as -- as contrasted with simulcasting.

Also as the record knows and I know, we all know, that the royalty implications of additional plays for broadcast is zero for the record companies, and so it makes sense that, to the extent that playing record companies' music over-the-air broadcasting, to the extent that induces more plays through alternative modes, of course that's gainful for the record companies because they're not making any royalties from plays over the air, but they may very well be earning royalties from the plays of that music. If those plays are induced by or encouraged by exposure over the air, that alternative mode play of that same music brings royalties; whereas more plays over the air would not.

That's not the case for simulcasting. Simulcasting is where the -- the logic doesn't apply because simulcasting itself brings royalties. And so to the extent that simulcasting exposure brings more audience interest to that music through alternative modes is not necessarily beneficial to the record company.

The question of, okay, which has more value to the record company in terms of the royalties that are induced. For example, suppose that plays on simulcasting would be promotional in the activity sense to more plays of that music in broadcast. Well, that wouldn't be beneficial to the record companies. That would be the opposite of compensatory promotion, since more plays on broadcast would actually take away from the royalties that would otherwise be earned.

So it makes no logical sense and it is inconsistent with industry views to say that the promotional value over the air means that there is promotional value to plays on simulcasting.

MR. WETZEL: Your Honor, I would move to strike the preceding response. That goes well beyond the single sentence that Dr. Willig has offered in the footnote in his rebuttal testimony.

THE WITNESS: Show more of the video, counsel, please.

MR. WARREN: I'm sorry, Your Honors, were you eliciting response from me to that?

CHIEF JUDGE FEDER: Yes, I was.

MR. WARREN: Thank you. Yes, we believe that this is nothing more than adding some additional economic color to the testimony that's up there. I mean, I think we -- we would request a little bit of leeway for the witness to just expound on this, and I don't have any further questions on this particular topic, in any event.

THE WITNESS: May I speak?

CHIEF JUDGE FEDER: No, you may not.

THE WITNESS: You only showed the first sentence, counsel.

MR. WARREN: Professor, allow the Judges to rule, please.

MR. WETZEL: May I respond, Your Honor, briefly?

CHIEF JUDGE FEDER: Briefly.

MR. WETZEL: I just want to say that this is exactly what we were worried about yesterday in our opening because there -- there is no record that SoundExchange has built on this point and -- and we suspected that they may try to introduce and expand upon what they've done in live testimony.

So we would just ask that the witnesses be kept to the scope of -- of their written testimony.

CHIEF JUDGE FEDER: Okay. We'll take a -- a brief recess. I want to discuss this with my colleagues on Skype.

MR. WARREN: Thank you, Your Honor.

MR. WETZEL: Thank you, Your Honor.

(Off-the-record conference with the Judges.)

CHIEF JUDGE FEDER: Okay. Is our feed still going?

MR. TOTH: Stand by. I have it in recess. I will let you know when it's live. I'm sorry, Judge, I should ask, would you like to go live?

CHIEF JUDGE FEDER: Yes, please.

MR. SACK: Thank you, Your Honor.

MR. TOTH: We are live.

CHIEF JUDGE FEDER: Okay. The objection is sustained. The -- a witness may, of course, paraphrase their -- their written testimony, but this goes well beyond that. This is really new testimony. This is -- these are matters that Professor Willig could have addressed in his written rebuttal testimony and did not. And we will not permit him to add that here.

In addition, this is not legitimate surrebuttal because it does not address points that were raised in rebuttal testimony, at least none that has been identified to us. So let's move on.

MR. WETZEL: Thank you, Your Honor.

CHIEF JUDGE FEDER: And -- okay. Never mind. Please proceed.

MR. WARREN: Thank you, Your Honor. And I take it that Mr. Wetzel's objection applied to a portion of that answer, but not all of that answer, and that the beginning part that was more closely tethered to the written footnote would be permitted to stand in the record; is that correct?

CHIEF JUDGE FEDER: The portion that -- the portion of the answer that took place before the break, before the lunch break, may stand. If there is any portion of -- I'm not going to go parse the transcript right now.

Once you've received the transcript, if there is any portion of that answer that you feel is not subject to our order, you may identify that and Mr. Wetzel may object at that time. So please proceed.

MR. WARREN: Thank you, Your Honor. Thank you, Your Honor.

BY MR. WARREN:

Q. All right. So just to reorient us, Professor, I'm going to return to your roadmap here. And we've talked about the Shapley Value approach and how it works. We've also talked conceptually about opportunity cost. Let's talk about the inputs that you considered in generating your opportunity cost numbers.

So I see here you have a flow chart explaining how you can --

JUDGE STRICKLER: Before you go on to this next point, Mr. Warren, I'm sorry to interrupt you, I thought you were also going to ask the witness about, on -- on slide 17, the second statutory point, if we can go back to that. Thank you.

And this slide says -- points out what it says in the statute, that the Judges shall base their decision on, among other things, the transmitting entities' relative technological contribution and capital investment, among other things.

Professor Willig, in your Shapley model, did you consider the -- the investments made by the services or the record companies, for that matter, with regard to technological contribution and capital investment?

THE WITNESS: I considered, I would say, all of these things because they are encapsulated and summarized in the valuation of the various accommodations of the bargaining parties through the -- what we call the characteristic function, the assessment of what value they can create. And the value that they can create in various combinations of license agreements, of course, go back to what the various parties bring with respect to the contributions, with respect to the technology that they contribute, on the part of the services especially, the capital investment that goes into the capability of those services, the capital investment, the cost, and the risks that went into the establishment of the portfolios of music, the libraries that the labels bring into a service.

All of these different elements of contribution are summarized in the value dollars quantified that each party contributes to the various subsets whose incremental values go up to the Shapley Value.

So I do think the Shapley model very squarely adheres to the way I read this portion of the statute.

JUDGE STRICKLER: Let me follow up on that. One of the characteristic functions that exists is major 1, major 2, and then a distributor or a non-interactive service.

So you don't have the third must-have. If I recall your testimony correctly from this morning, sir, you said that the characteristic function has a value because those other labels bring with them the values that arise from the fact that they're able to distribute through other distribution networks.

But how does that characteristic value incorporate the technological contribution or the capital investment by the service?

THE WITNESS: So in that situation where there is a left-out must-have label, in that circumstance, the service actually can't bring any market value from its capital investment and whatever costs that it has expended to enable itself to operate. Only when all the must-haves are aboard with their own license agreements can the full value of those contributions be realized.

And with -- in a must-have situation, that's reality. And the model is merely reflecting that reality in the must-have context.

JUDGE STRICKLER: So are you saying that once that third major joins that coalition, to complete all the parties being -- having arrived, that at that point your model implicitly allows the service to recover its technological contribution and capital investment provided the surplus and, therefore, their Shapley Value is large enough to cover it?

THE WITNESS: The -- the increment in the characteristic function in the valuation, when a label arrives, is the extra value created by that label's arrival. In other orders of arrival, the distributor is coming to the table and the labels are already there.

And without the distributor being part of the coalition, being part of the subset, all the labels can do is their earnings from outside sources, not from the non-interactive services that are at issue. But when one of the non-interactive services arrives to join the subset, all of a sudden the valuation that's made possible by that grouping of the parties becomes elevated by the fruits of what that service brings to the marketplace.

JUDGE STRICKLER: And what about those arrival orderings where the distributor is not the last to arrive, does the incremental value added by the -- by the final major, does that permit the technological contribution costs, whatever they -- investments, whatever they may be, or the capital investments, whatever they may be, by the service to be recovered?

THE WITNESS: Well, that increment when a label joins the -- the subset is attributed to the arrival of that label, that record company, because before it arrived, the value of that subset doesn't include the -- does not include the operation of the service. It includes the outside earnings of the other labels, but it's still not operating as a service because it doesn't have all the inputs that it needs.

So that increment when party A arrives is attributable to party A, but the increment when the distributor arrives is all attributed to the distributor within the averaging of these incremental values that leads to the determination of the Shapley Value.

JUDGE STRICKLER: Thank you.

BY MR. WARREN:

Q. I'm sorry, I realized that I was just on mute. It's a Zoom foul.

Professor, could you please explain this flow chart so we can understand how you went about computing opportunity cost?

A. Sure. We've already looked at this, but, remember, on the left-hand side all the way is the circle that represents all of the Pandora plays when all the -- when all the labels are aboard.

And then plays that are lost are lost, depending upon the size of the second figure, all plays lost, in this case, because this is the must-have specification. And then we have the slice of the pie that are the Sony plays. Here Sony is the example for a label that's blacked out, causing the operation of the service to be eliminated.

So the plays in that pie shape are retained, according to the picture, by Sony, and then the next question is where do the lost plays go? And that's the diversion ratios that we discussed, so that slice of the pie that are the retained plays by Sony, although elsewhere, are divided up according to the diversion ratios as between outside other modes of distribution, for example, Spotify, satellite, and so forth, and then in terms of getting from there to opportunity cost, all of those diverted plays from Sony that are now reappearing elsewhere may or may not bring in royalty flows to Sony.

So to the extent those plays are diverted to AM/FM, there is no royalty impact back to Sony. To the extent that those plays reappear on satellite, well, it kind of depends upon what the impact is on the subscribership to SiriusXM's satellite service because Sirius pays on the basis of the subscription fees that it collects. And, likewise, paid Spotify.

On the other hand, free Spotify, well, that pays on the basis of plays. And so there that portion of opportunity cost is figured on the basis of the incremental plays on free Spotify caused by this diversion from the chain that started out with Pandora way over on the left.

Q. All right. Thank you, Professor.

And let's focus in on the must-have specification. We're going to go through the evidence, so I'll ask to close the courtroom, but before we do that, can you just remind us how important this specification is or isn't to your results?

A. Well, the size of the circle is much affected by whether or not there is the must-have specification, but in my sensitivity tests, which we'll get to by 6:00 o'clock, the sensitivity tests do vary that assumption and make alternative assumptions to see what impact there is on the bottom line for royalties of the model, and there are examples in my roster of sensitivity tests that show that if the all majors being must-haves feature of the model is discarded in favor of other alternatives, then that doesn't necessarily make a substantial change in the bottom-line royalties.

And we'll see that later on.

Q. All right.

MR. WARREN: So at this time, Your Honors, I would ask to close the courtroom so that we can review some of the evidence.

CHIEF JUDGE FEDER: Okay. Will the host please close the virtual courtroom and cut the public feed for the time being while we go into restricted session.

MR. SACK: Yes, Your Honor. Thank you.

(Whereupon, the trial proceeded in confidential session.)

O P E N   S E S S I O N

CHIEF JUDGE FEDER: Thank you. We are returning to public session. Mr. Warren, please proceed.

MR. WARREN: Thank you, Judge Feder.

MR. SACK: The room is unlocked now.

MR. WARREN: Thank you.

BY MR. WARREN:

Q. Professor, if the majors are, in fact, must-have, doesn't your model need an effective competition adjustment?

A. No, it does not.

Q. Can you explain why not?

A. Well, first of all, the must-have status really derives from the value that the record companies bring to their relationship and to the negotiation over their relationship with the distributor.

And it's understood, and I think the documents help to provide some -- some context for that, but it's just well-known that this is a hit-driven business and that what the audience really needs to be satisfied with the service is the availability of the important hits.

MR. WETZEL: Objection, Your Honor. This is

Joe Wetzel for NAB. Move to strike the commentary on -- on what is well-known to everybody. I don't think the witness has foundation for that.

CHIEF JUDGE FEDER: Mr. Warren?

MR. WARREN: Well, I think it's the -- I think it is well-known. I don't -- I don't know. I can ask the witness to lay some foundation, if that would help.

CHIEF JUDGE FEDER: Please do.

BY MR. WARREN:

Q. All right. Professor, what's the basis for your statement that services need the hits? I believe that's what you just testified to.

A. Yes. I'm trying to think of all the reading I've done about the industry over the last 20, 30 years, which is the foundation for that understanding.

Most recently -- and, again, it's part of a broad quilt -- the documents that we were just looking at and that I had cited in my report are examples of the companies saying to themselves that very point, that when it comes to the overall appeal of what they have to offer in terms of their portfolios, the -- the hits are extremely important to the overall size of the audience that they're able to draw. And, of course, Pandora itself was saying that same sort of thing in the internal document from Pandora.

But this is just consistent with what is very much a part of my background as somebody who has worked on issues involving the music industry for a very long time.

MR. WARREN: Your Honors, on the basis of that testimony, I'd ask you to overrule the objection.

CHIEF JUDGE FEDER: Mr. Wetzel?

MR. WETZEL: Your Honor, I think we have fact witness testimony that -- that will establish, you know, what -- how the labels are perceiving things and thinking of things, and I don't think Mr. -- Dr. Willig, sorry, should be able to just interject into the record things that are known to all based on some amorphous 20 to 30 years of experience reading on these issues.

MR. WARREN: Your Honor, if I may --

CHIEF JUDGE FEDER: The objection is overruled.

MR. WARREN: Thank you.

BY MR. WARREN:

Q. So just to focus on the second sub-bullet here, so we're clear on this point, does the must-have status of the record companies derive from their ability to extract above market rates through something like cartelization or collusion?

A. No, that's really not intrinsic to this picture. The hits and the appeal of a portfolio of music that might -- might become the subject of a license if it's supported in the unregulated marketplace, doesn't come from any ability of the label, the owner of -- of the rights to be collusive about it or to cartelize with respect to other owners of rights to other music. It comes, rather, from the value that their own portfolios and the rights to those portfolios bring to the potential distributor of that music.

And in the Shapley Value model -- and I would say even in Professor Shapiro's model -- the extent to which there is value to the service in terms of impact on its appeal and impact on its demand from the music brought to the service from the label, that's what undergirds the value in terms of the value over which these negotiations proceed, not through cartelization, not through some sort of a -- of a holdup effect but, rather, from the value that the music brings to the service.

Q. Professor, we're going to talk --
JUDGE STRICKLER: Excuse me, Mr. Warren.
MR. WARREN: Please.
JUDGE STRICKLER: Professor Willig, in Web IV, I believe we talked about complementary oligopoly, and in part we made reference to -- I guess it was -- it was the title of an article but it sums up the point -- the tragedy of the anticommons and the impact of -- of complementary oligopoly.
Are you familiar with that issue in economics?
THE WITNESS: I've certainly heard about it. I don't recall that particular article, the anticommons.
JUDGE STRICKLER: Well, we also cited the article by Depoorter and Parisi in the Web IV opinion. Are you familiar with that?
THE WITNESS: At this time, I don't recall that particular article.
JUDGE STRICKLER: Okay. Well, the question I have for you is, with three different must-haves, do you end up with -- leaving out the Shapley Value analysis for the moment, as a matter of economic theory, when you have three must-haves, do you end up with higher prices, in this case higher royalties,

than if you had just a monopoly controlling all three of the -- of the repertoires? And I understand what you said before about how a monopoly might not be as dynamic, but leaving aside that -- that potential dynamism issue, can you answer my question?

THE WITNESS: Well, it's true that in a formal -- you asked me to do this outside of the Shapley Value context, Your Honor, and we can talk about what models I should consider to answer your question, but within the confines of a Shapley Value model, each party who brings a necessary input to the overall enterprise is going to have to be paid at least its opportunity cost, plus a share of the surplus value that is generated by the completion of the enterprise.

And so in a way, the more hands there are in terms of extracting portions of the surplus, more of that surplus will be extracted in total by -- by all of them. And yet --

JUDGE STRICKLER: By all -- by all of the record companies?

THE WITNESS: Well, whoever is being proliferated in terms of must-haves.

JUDGE STRICKLER: Okay, thank you.

THE WITNESS: So -- yeah. But it's really crucial, I think -- and I don't mean to contradict what you're saying -- but to imagine a different industry structure only on one side of the market without also considering its impact on the other side of the market is really not -- not reliable analysis. What would monopolization do to the value that's created at the same time should be considered along with the impact it would have on how many hands there are needing to split the surplus.

JUDGE STRICKLER: Thank you.

BY MR. WARREN:

Q. Professor, this is a little bit of a different issue, but it's related to some of the questions that Judge Strickler was just asking. So we'll talk in a bit about the royalty rates that you compute for outside music distribution sources. But I just want to take this opportunity now to ask whether you continue to follow what you called the fork in the road approach in SDARS III.

A. Yes. When we get to the completion of the discussion of how opportunity costs are calculated in my modeling, we will see that I do, indeed, need -- and we talked about this already -- need royalty rates for outside -- from outside distribution to complete the idea of the measurement of opportunity cost.

And what I have done is following the "take things as they are" philosophy, and that's one of the forks in the road. That's the way the market is. And that means taking the royalties from outside music distribution as, in fact, the data show them to be, with the most applicable source of data.

That includes zero compensation from over-the-air broadcast use of the music, and it includes the actual royalty structure of what's being paid by, say, paid Spotify, which is a very important part of that marketplace today. What are they actually paying, just as I incorporate what the broadcast AM/FM sources of distribution are actually paying. One is relatively more than average. The other is certainly less than zero.

But that's all part of that fork in the road.

Q. So, Professor, did you need any kind of effective competition adjustment when computing the royalties earned from sources such as paid on-demand where there might be complementary inefficiencies?

A. I -- I did not from the construction of the procedure that I followed. I also did not because of the nature of Shapley Value, just to complete the thought.

And this is, in part, an answer to His Honor that the idea of holdup value or complementary oligopoly holdup power, in part, if one were to somehow think about that in isolation, it would be in the situation where each of these providers of essential inputs can hold up the whole operation. That's the idea of the holdup value. And in these complementary oligopoly models, each of several parties have the power to do that.

But that's not represented in that full force, in that, I would say, rather biased way under the Shapley Value construction because, remember, the Shapley Value considers all the rival orderings. So even if there's an input provider, even if there's a record company that is a must-have, in terms of the Shapley Value, the incremental value it brings to the enterprise is not the only thing that matters. In fact, it's only -- it's in its place as one part of the overall combinations of incremental value that that party brings to the negotiation.

Unless that party is the last one to arrive, there's really no issue of it being someone who can crash the entire enterprise by holding out. But Shapley considers all the rival orderings. And so everybody who was necessary to the deal sometimes is going to be the last one to arrive, including the distributor itself. That's really so important to realize.

If all the labels were already there, they can't do anything extra over and above what they're getting from outside, just among themselves. And then the distributor arrives and all of a sudden great value created by that distributor. And there's many, many, many arrival orderings where it is the distributor who was the last one to arrive.

It's a must-have, in the same way that any other record company who was itself a must-have is a must-have. And that's why the surplus is split evenly by Shapley Value among the must-haves.

It's not from some philosophical idea of equity; just from the fact that the must-haves are each necessary and sometimes they're the last ones to arrive and create a great deal of incremental value. But no preferential orderings are allowed in the Shapley Value construction.

Q. Thank you, Professor.

All right. Now, we've spent quite a good deal of time talking about your must-have specification, which is the first pie in the flow chart. And I promise we'll spend a considerably less amount of time on this aspect of the flow chart.

Can you remind us what retention is?

A. Yeah, retention is the plays that will be, you might say, preserved or retained to a particular record company in the event that the service that we're talking about goes away, and it will go away under the must-have specification if one of the must-have record companies is blocked out, and so that record company -- here in this example it's Sony -- is going to retain all of the plays, with one small caveat, elsewhere through some other form of music distribution.

And the caveat is that the surveys allow the respondent to say: Well, I might spend more time doing something else, not listening to music at all. And that will take away in proportion some part of the retention of plays to the blacked-out label.

But, otherwise, that label will retain all of the plays that it used to have on the blacked-out service.

Q. Very well. So, hopefully making good on my promise to keep us moving, let's move down the flow chart and talk about diversion ratios.

Where did you obtain the diversion ratios

for your opportunity cost calculations?
A. I made use of Zauberman Survey results, and also sometimes in footnotes, I make use of the Hanssens Survey, as you'll see. And I also take a note of the modified Hanssens Survey from time to time in my reports or in the appendices, but in my primary model, I rely on the Zauberman.
Q. And just remind us, who sponsored each of those witnesses' testimony?
A. Professor Zauberman was the creator of the survey that was sponsored by SoundExchange. Professor Hanssens did a survey that was sponsored by Pandora/Sirius. And Professor Simonson, who was engaged by SoundExchange, conducted the modified Hanssens Survey.
Q. Now, I see you have a chart here comparing the Zauberman and the Hanssens Survey. So according to the Hanssens Survey, what percentage of respondents would switch to new subscriptions to an on-demand service like Spotify?
A. Yes, 21.3 percent of the respondents in the event that they were dissatisfied with their ad-supported service because it was missing important music to them. 21.3 percent of those respondents said that they would pay for a new subscription to a

subscription on-demand service.

Q. And how do the results of the Hanssens Survey for that category compare to the Zauberman Survey?

A. The Zauberman Survey came up with a finding of 9.1 percent of the respondents saying that they would pay for a new subscription through a subscription on-demand service.

Q. So if you were to use the Hanssens Survey sponsored by Pandora instead of the Zauberman Survey sponsored by SoundExchange, how would that affect record company opportunity cost?

A. That would much elevate the opportunity cost built up from those numbers. So from that point of view, the Zauberman Survey is quite conservative when it comes to my use of the surveys for the estimation of opportunity costs.

JUDGE STRICKLER: When you say for the --

BY MR. WARREN:

Q. Professor --

JUDGE STRICKLER: Excuse me, Mr. Warren. When you -- are you making that -- that conclusion as a general conclusion adding up all of the rows of alternatives for diversion or are you saying just as it relates to subscription on-demand, it would greatly increase the opportunity cost?

THE WITNESS: Right. We -- we see from the first row, that it certainly does apply to the first row. The first row is dominant in terms of impact on the bottom line, but also I have done these calculations in total. And what I said absolutely is right.

JUDGE STRICKLER: Thank you.

BY MR. WARREN:

Q. And -- and, Professor, does the Hanssens Survey show more diversion to each of the other forms of outside distribution compared to the Zauberman Survey?

A. Yes, it does.

Q. Okay. Are each of the rows in this chart measured in the same units? I'm focusing in particular on the last one.

A. I'm sorry, the bottom row of the chart?

Q. Well, let's start with all the rows except the last row. Are those measured in the same unit?

A. No, they're not. The first row, as I just discussed, is percent of respondents who would pay for new subscriptions, whereas, for example, the second row and likewise the fourth row -- that's not right. My eyes are squinting.

Q. Professor, let me -- let me sharpen my question, because I don't think I was sufficiently clear.

I'm just asking if the two columns are measured in the same unit?

A. Oh, yeah, the two columns certainly are. The rows are not.

Q. Right. Okay. And -- but what about with respect to the last row? I see that you -- you specify the units in that row but not the others. Is there a reason for that?

A. I see. Yeah, the last row, the CD, vinyl, downloads row is somewhat different in terms of the units. I can and did adduce from the Zauberman Survey results a percentage of respondents who would become "new purchasers" of those categories, CD, vinyl, and downloads, whereas the Hanssens Survey doesn't exactly allow that precise deduction.

Instead, what comes out of Hanssens is the percent of respondents who would increase their purchases of those modes of music distribution. So it's not quite the same. One is new purchasers. The other is increased purchases.

So it's a little bit --

Q. Does that --

A. -- but they're related.

Q. Okay. Does that apples to oranges for the last row impact your conclusion that opportunity costs would be higher if using the diversion ratios from Hanssens rather than Zauberman?

A. No.

Q. Why is that?

A. Well, again, the first row is by far and away the most important quantitatively.

Q. Okay. Let's move to the next slide. How is this different from the previous slide?

A. Good question. Ah. So the colors of the rows are a little bit different, but now we're talking about subscription non-interactive users instead of ad-supported non-interactive users.

Q. And can you give us an overview of what you learned from the Zauberman and Hanssens Survey about where users of subscription non-interactive services would divert if those services became unavailable?

A. So here in the Hanssens Survey, 20.6 percent of the respondents say they would pay for new subscriptions to the subscription-based on-demand services, in contrast to Professor Zauberman, who found 11.5 percent of his respondents would pay for such new subscriptions.

Q. Okay. And I -- is it correct that you have the same or a similar apples-to-oranges issue for the last row concerning diversion to CDs, vinyl, and digital downloads?

A. Yes, it was the same form of the questions, but directed to a different sample of the respondents, depending upon which services they were currently using. Are they listeners to ad-supported or, rather, are they listeners to subscription-supported, non-interactive services?

Q. And notwithstanding that issue, were you able to determine how record company opportunity costs would be affected if you used the diversion ratios from Hanssens, rather than Zauberman?

A. Yes, either way for both samples, the Hanssens Survey would lead to larger estimates of the opportunity cost.

Q. Okay. Professor, remind us what the last step is in your opportunity cost flow chart.

A. So the last step assigns incremental moneys that would be paid to the services from their diverted music, if that diverted music wound up on one distribution mode or another, because the royalty structures are different, depending upon what are those distribution modes.

Q. And what does this chart on slide 34 depict?
A. So these are the applicable royalty rates that I used from other forms of distribution, other than the non-interactives that are the subject of the analysis, although we'll see in a moment that that's slightly more complicated.
Q. All right. Let's start with the first row highlighted here, which appears to correspond to subscription on-demand services.
So, as an initial matter, how do services like that generate royalties?
A. They generate royalties on the basis of the number of subscribers that they have.
Q. And how much opportunity cost did you determine is associated with subscription on-demand services?
A. Well, that's the $4.89 number, and that's per subscriber and per month. So every month that there's an additional subscriber, there's the extra amount of royalty generated to the providers of the music.
Q. Professor, how did you handle diversion to existing subscriptions? So let's say someone lost their non-interactive service and then they're just going to fall back on a subscription to Spotify

Premium that they already have.

What did you do about that?

A. Yeah, so if there's additional use of an existing subscription, that means that there's no additional money being paid to the service by its user, the one who is merely expanding the use of an existing subscription, and that means there's no added royalties being paid to the record companies.

Q. Professor --

JUDGE STRICKLER: Excuse me, did Professor Zauberman's survey allow you to distinguish between those that would purchase a subscription to a new on-demand service as opposed to those who would just decrease their use of a -- an on-demand service to which they already subscribe?

THE WITNESS: Yeah, Professor Zauberman's survey allows one to see whether they'll be listening to a paid interactive service after the elimination of the ad-supported non-interactive service, whereas that same person was not listening to such a service before the elimination of the ad-supported non-interactive service.

If they went from not listening to listening, that means they took a subscription. That's Zauberman.

JUDGE STRICKLER: Thank you.
BY MR. WARREN:
Q. Professor, let's go to the next row. How does an ad-supported service like Spotify Free generate royalties?
A. It generates royalties on a per-play basis.
Q. What's the element of opportunity cost associated with diversion to ad-supported on-demand services?
A. So if a record company would be experiencing more plays on an ad-supported service, then that means if it were paying royalties on that same basis, per play, that that record company would be receiving more money in the way of royalties resulting from more plays for that record company's music on the service.
So it's a question of how many extra plays are there? And that drives extra royalties being paid to the record company.
Q. Professor, what is the element of opportunity cost associated with SiriusXM's satellite radio?
A. SiriusXM satellite is also a subscription-based service, which pays royalties on the basis of the number of subscriptions. And that

number here is $1.48 to the providers of the music, although that's a bit -- well, maybe significantly -- it's an understatement of the actual relevant amount of money, but it's what I had available in the data.

Q. Professor, in your written report, did you explain why you think this is an understatement?

A. I did.

Q. Could you explain that now?

A. Yes. So in my data, there's no royalties that had been paid at that time for the playing of pre-1972 music. And that's changed recently as a matter of law, and that's not reflected in the data that I had available to me.

And, in addition, I didn't have royalty numbers for those paid directly to providers of music through direct licenses. And so the $1.48 doesn't include royalties paid to owners of music, intellectual property licensed in a direct way with Sirius.

Q. Professor, what opportunity cost did you calculate that's associated with diversion to CDs, vinyl, and digital downloads?

A. So, originally in my report, I calculated $2.01. And --

Q. Okay. And what data did you consider to arrive at that number?

A. Yeah, so I considered the average spending that were in data reports by users who are buyers of CDs, vinyl records, and digital downloads. How much does a typical purchaser of those modes of music distribution actually spend per month? And then I had data on the percent of spending that would be turned into royalties, so I applied those royalty percentages to those amounts of money being spent, and then I averaged across the different modes and looked at the survey results for indications of how many new purchasers there would be. And that's how I derived that number.

Q. Professor, isn't it true that sales of physical media are continuing to trend down?

A. I think that's true. The data do seem to indicate that.

Q. So does your reliance on historical data, rather than forecasted sales data, affect the reliability of your computation?

A. So, no, because this number, $2.01 -- and I would like to say that some back-and-forth between me and Mr. Shapiro had resulted in a revision of that number, but I've still gone forward in my calculations out of conservatism with the $2.01

number, just as a footnote on this conversation.

But that is the number that applies to a new purchaser. And if there are fewer new purchasers, that just means that $2.01 applies to a smaller base of such people, but on this chart and in my calculation of opportunity cost, what counts is the amount of extra royalties per new purchaser of those physical modes of distribution.

JUDGE STRICKLER: Professor Willig, you say that there has been some back-and-forth between you and Mr. Shapiro, and I've seen his rebuttal testimony with regard to this number, and you say that's resulted in some revision of that number.

Whose revision? Yours, Professor Shapiro's or both of you?

THE WITNESS: Well, mine, actually. I can't take responsibility for his, but my new number is $2.17. And that arises from changing the element of this use of the data where the weighted average is applied.

And he pointed out that maybe I wasn't perfectly logical in where I applied my weights, and I think there was some merit to that point that Professor Shapiro made, so I went back and I changed that, but while doing that, I also realized that with his way of doing it, the answer depends upon the number of people, the number of purchasers that are considered, because there's a total amount of money spent that's divided by the number of people.

And I think he calculated that number of people wrong.

MR. MARKS: Objection.

CHIEF JUDGE FEDER: One moment, Professor. Mr. Marks?

MR. MARKS: Yeah, if I could just object. I -- I think we're now straying out of responding to the criticism and getting into new analysis, so I didn't object in -- to the witness explaining the -- the response to Professor Shapiro's criticism, but I think here we're on the verge of getting into a new analysis that was conducted after the submission of his written rebuttal testimony, and I think that's out of bounds.

JUDGE STRICKLER: Mr. Warren, was this an area that you were planning on exploring in more detail later?

MR. WARREN: No. This was the time I was going to explore it. And, you know, so I think this is an appropriate time to take up this issue. You know, first --

JUDGE STRICKLER: Well, maybe -- maybe before we do, and I'll -- I'll just throw this out -- it's open for the moment, maybe we allow you to present it in the way you want to present it, and then, Mr. Marks, you could raise the objection specifically as it relates to these answers to Mr. Warren's questions. How is that?

MR. MARKS: I'll proceed however Your Honor would like.

CHIEF JUDGE FEDER: Okay. We will --

MR. WARREN: Your Honor, all I -- all I -- I'm sorry.

JUDGE STRICKLER: Let the -- let the Chief Judge weigh in here.

CHIEF JUDGE FEDER: I was going to say we will proceed on that basis after our afternoon break, which we will take now for 15 minutes.

MR. WARREN: Thank you, Your Honor.

(A recess was taken at 4:31 p.m. EST, after which the hearing resumed at 4:47 p.m. EST)

CHIEF JUDGE FEDER: Does the host need a moment to begin our feed?

MR. TOTH: Please standby, Your Honor. We are now live.

CHIEF JUDGE FEDER: Thank you. We will

continue.

Mr. Warren, could you just remind me, are we in public session now, because I believe we went back into public session, but I see a restricted document up on the screen and we have been talking about numbers in that document.

MR. WARREN: Your Honor, I hope we -- I thought we were in closed session, and I think we ought to be in closed session, so if we can pull that down and make sure that we are before we go forward.

CHIEF JUDGE FEDER: The public feed doesn't get the video.

MR. WARREN: That's right, yes.

THE REPORTER: This is the court reporter. We were not in closed session.

CHIEF JUDGE FEDER: Okay. Yes, we should be. Once you have gotten the transcripts, can you please identify those portions of the material from the last, you know, 30 minutes or so that should have been in restricted session so that we can make the appropriate adjustment? We're going to go into restricted session now.

I ask the host to please cut the public feed and clear the virtual hearing room.

MR. TOTH: Yes, Your Honor, standby.

(Whereupon, the trial proceeded in confidential session.)

O P E N S E S S I O N

MR. SACK: Thank you, Your Honor.

MR. TOTH: The room is unlocked and the feed is active, Your Honor.

CHIEF JUDGE FEDER: Thank you, Mr. Toth. Okay. We are going back into public session, but only briefly for about five minutes.

Mr. Warren, please continue.

MR. WARREN: Thank you, Your Honor.

BY MR. WARREN:

Q. So, Professor, we have discussed the opportunity cost floor, the willingness to pay ceiling. Let's put that together.

Can you remind us how those both fit in, and we will walk briefly through some of the algebra, but very briefly?

A. Mindful of the hour, yes. The Shapley Value is calculated as per the example hours ago for the six parties at issue here as I have modeled them. And the Shapley Value model needs to have a calculation making use of all the input data that we have been talking about just to calculate what is termed formally the characteristic function.

And the characteristic function needs to be calculated for every subset of the parties, here the four record companies and the two proxy distributors, so as to enable the model to assess what is the incremental contribution that each of those parties make, given all possible arrival orders. Sometimes the labels go first. Sometimes the distributor comes first and so forth.

For each such possible arrival ordering, the incremental value of each party needs to be assessed, and the characteristic function says what is the value of a particular subset.

So, for example, if you can tolerate all of the algebra at the bottom of the page, that is an example of what a calculation, of one of the values of the characteristic function, how it works expressed algebraically in my model.

So the subset at issue here is symbolized by D1, LA, LB, LC. D1 is the ad-supported distributor and ABC are the three major record companies. So V of that collection of the parties is the value that they can create at the bargaining table if it is just the four of them.

So the amalgam Indie is out of this particular subset. And D2, the distributor for subscription supported non-interactive services is not in the subset. So it's not everybody, but it's enough for D1 to be in operation because the three must-haves are there within the subset.

Q. Now, Professor, do you recall your discussion with Judge Strickler earlier today about record company financials and whether those enter your algebra? Do you recall that discussion?

A. Yes, I do.

Q. Are record company financials symbolized anywhere in this equation?

A. Yes. CA is the cost of record label A, B, and C, similarly.

Q. Okay. And can you just remind us why those inputs wouldn't ultimately matter to the calculation?

A. The labels are going to experience those costs, as they are here in this formulation, whether or not they license their music to the ad-supported non-interactive distributor.

Because if they don't, then they are still going to be licensing their music to, say, the interactive distributors, for example, and to the other ways of music distribution that we contemplate.

And so their generation of that music and their signing of those artists and the investments that they make pursuant to creating that music, those recordings of that music are in those costs, and they will be expended regardless of whether the license is actually dealt and accepted or not.

And so at the end of the day, the royalties are not going to depend upon those costs.

Q. I apologize if I'm putting this just in layman non-mathematical terms, but is it fair to say then that those costs just fall out of the math?

A. That's a very technical and proper way to say it, in my view.

Q. Thank you. Is that roughly, is that correct?

A. Yes, it's not only a good way to say it. It's a correct way to say it.

Q. And so let's just quickly look at how some of the concepts we were discussing earlier show up in the math.

What's this term that's highlighted on the screen?

A. Yes. So capital O, sub 2, divided by little A bar, sub 2. It's easy to chuckle at this now but I remember inventing this limitation a year ago or more, that's the per-play opportunity cost from outside distributors when service D2 is not operating.

So by outside distributors here, that means the non-interactives -- no, it means the interactives who are outside the domain of the non-interactives, and it's what is the per-play opportunity cost from royalties that are paid by the outside distributors in the event that D2, the subscription supported non-interactive service, is not operating.

And that stipulation is important because whether or not D2 is operating in the model and also given the survey results, as well as commonsense, is going to affect how many plays there are on these outside sources of distribution. And that, in turn, will influence the royalty flow.

And so the per-play opportunity costs from the outside distributors do depend in the model and in reality on whether here, for example, D2 is operating or not. So this particular symbol captures what it says. It stipulates that D2 is not operating.

D2 is not operating because D2 is not part of the subset of the parties for which the characteristic function is trying to estimate the value created. D2 is down, but that influences how many plays there are on the other active distributors and, therefore, that affects royalty flows into the labels as their opportunity cost.

Q. Okay. And because we're in public session, I won't have you say any numbers, but we had looked at a tableau of various opportunity costs from things like CDs, services like Spotify and so forth.

Are those the kind of inputs that would be factored into this variable?

A. Oh, yes, absolutely.

Q. What does --

JUDGE STRICKLER: Professor Willig, excuse me once more. A moment ago I asked you whether or not the profit rates that you were utilizing and calculating were -- had included fixed costs of the distributor or not. And I thought your answer was it did.

But looking at this slide 42, I see that you refer to the variable profit rate of distributor 1. Do you see that at the bottom of this demonstrative?

THE WITNESS: I don't see it on the bottom because counsel is animating this slide, but it will appear there after he clicks a few more times.

JUDGE STRICKLER: Okay. Well, I'm no soothsayer, and I have the hard copy.

THE WITNESS: Yes. So, indeed, the little M1, super P, is defined as the variable profit rate of distributor 1. That's why the subscript 1 is there. And it's on a per-play basis. Hence the little P.

And as we discussed a moment ago, is properly for this model before paying royalties, not all royalties, but the royalties that are at issue in this calculation, namely, the royalties to the labels and to the artists for the work behind the recordings.

And it's variable, Your Honor, because what's -- what it is multiplying is the impact of changes in which forms of distribution are operating, and what difference that makes to the profits that come into the subset of parties because of the inclusion of D1 in that subset.

So added plays because, say, operator D2 is not operating, what's the profit impact of the added plays on the ad-supported distribution service due to the fact that D2, the subscription supported service, is not operating in this particular scenario.

And so that needs to change in the audience measured in plays multiplied by the variable profit rate. And that's --

JUDGE STRICKLER: By variable -- let me try to go back to something more basic. Can you please define variable profit rate as it's used here at the bottom of slide 42?

THE WITNESS: It's the change in profits that would accrue to the ad-supported service as a result in the change in the number of plays.

JUDGE STRICKLER: Does it include fixed costs?

THE WITNESS: No, it's the variable profit rate.

JUDGE STRICKLER: Thank you.

BY MR. WARREN:

Q. Professor, what is this next algebraic expression, the variable capital F, subscript 1?

A. That's the fixed costs of the first -- of the ad-supported distributor.

Q. Okay. So the fixed costs do enter the algebra; is that correct?

A. Oh, yes, but not in that same place as the little m, 1, p.

Q. Okay. So just so we're clear on this point, does this particular algebraic expression of the characteristic function for the subset of one distributor and three labels consider the distributor's variable profit rate and its fixed costs?

A. Yes, it does.

Q. Let me ask you about one more term on this equation. I am not even sure how to say this in words, but d, superscript P, subscript 2, 1, what concept is this variable trying to get at?

A. This is a measure of the diversion of plays to the ad-supported service in the situation where the subscription supported service is not operating.

And, again, that's what's applicable here because D2 is not part of the subset of the parties that this particular characteristic function is valuing, but that's going to have an impact on the number of plays that are experienced by the ad-supported service.

So that's the term that says what will the diversion be to the ad-supported service because D2 is not operating. And that's going to be hit by the variable profit rate because that's going to be an increment to the profits of the service due to D2 not operating.

And that's actually a reflection of the substitution or the competitiveness between the two different kinds of non-interactive services.

When one is not operating, that means more business for the other one, and vice versa. So that's the kind of substitution that is a reflection of competition between those two kinds of services.

Q. Okay. And the inputs for this variable, am I correct those come from the various surveys?

A. The diversion numbers, yes, including that little d, p, 2,1.

Q. So we've talked about how this equation contemplates variable profits for the distributor, fixed costs for the distributor, opportunity costs and diversion, as well as record company costs.

Is there any other aspect of this equation that you want to call to our attention at this point before we move on?

A. Well, notice the first term one minus share, and so all the majors are here and the one minus share subcapital D refers to what is their total share because they're all in this particular subset.

So share D is the share of the amalgam in the player among the record companies and the remaining share is the sum of the shares of A, B, and C.

So that's why that first term is there multiplying much of what comes up here.

Q. Okay. Very well. So hopefully you're willing to spare us the rest of the algebra and we can just get to the bottom line.

A. I will just point out, counsel, that that's one subset. There's a lot of subsets. And each one has its own valuation of the characteristic function and each one has its own algebra and it's all there in some appendix to my WDT.

Q. Very well.

MR. WARREN: And I think we ought to close the courtroom again at this point before we display the numbers.

CHIEF JUDGE FEDER: Okay. Mr. Warren, we have about 45 minutes of hearing time left today. Will we be going back into open session or will we be in restricted session for the remainder of the day?

MR. WARREN: Actually, we would likely be principally in open session for the remainder of the day. It is really just this next slide because it has the numbers that I wanted to close it, but I suppose it is possible for me to --

CHIEF JUDGE FEDER: I am not encouraging you to close the courtroom for the rest of the day. I just want to, for anybody who might be on, I want to give them a sense of whether we're going to be coming back on-line or if they can go about the rest of their day.

MR. WARREN: Thank you, Your Honor. Well, certainly I would not want to stop anyone from going about the rest of their day if they choose to do that, but I do believe we will be returning to public session after this next slide.

CHIEF JUDGE FEDER: Okay. So we will be going into restricted session for one slide for approximately, what, five, ten minutes?

MR. WARREN: Five minutes, something five, ten minutes, that's fair.

CHIEF JUDGE FEDER: All right. So I would ask the host to please close the virtual courtroom and turn off the public feed.

MR. SACK: Yes, Your Honor.

(Whereupon, the trial proceeded in confidential session.)

O P E N S E S S I O N

MR. TOTH: The room is unlocked and we have a live feed, Your Honor.

CHIEF JUDGE FEDER: Okay. We are back in open session. Mr. Warren, please proceed.

MR. WARREN: Thank you, Your Honor.

BY MR. WARREN:

Q. Now, Professor, let's get into module 2. And we're, I'm assuming, not going to finish with this today, but let's at least get a little bit of headway.

I believe you put a downpayment at the beginning of your testimony that you would be addressing three areas of disputes. Let's start with opportunity cost.

Now, we spent some time discussing your must-have specification. Does Dr. Shapiro agree with you that a service would lose all its plays absent a major record company?

A. He does not.

Q. In his view how many plays would be lost?

A. Oh, relatively few compared to the entire service finding itself to be unsustainable.

Q. Does Professor Shapiro utilize a term called the power ratio?

A. He does.

Q. What is that?

A. Formally that's the number of lost plays in the event of the blackout of a particular record company from the service, divided by that service's market share.

Q. And if a power ratio is small, what does that mean?

A. If a power ratio is small, it means that if the service is blacked out -- no, it is late for my tongue -- if a particular record company is blacked out, and that company, say, has a 25 percent share of the plays on the service, but the power ratio is small, the implication is that, say, just for an example, only 5 percent of the plays on that service are diverted, go away from the service.

And then one might say: Well, but I thought that label had 20 percent, and how come only 5 percent are lost? And the answer just from the arithmetic is, well, the rest, the 15 percent, are substituted for by the listeners to the service and the service from music from other labels, from other record companies.

So the loss may be in Professor Shapiro's view significantly smaller than the amount of plays that were blacked out in the first place.

Q. All right. So I'd like to ask you about the LSEs. Now, I just want to caution you, since we're in public session, please do not reveal the names of any of the record companies that were implicated or involved in this, just so that we can try to stay in open session to the extent possible.

So I believe you already mentioned what the LSEs are. What were they designed to show?

A. Well, that has a lot of different psychological levels to it, counsel. The LSEs intend to, as they are put forward, measure what would actually happen in the real world to the plays on the service in question if a particular record company's music were blacked out on that service.

So the intention, the put forward, the proffered purpose is as an experiment that will give information about the reality of the impact of the blacking out of an actual record company on the service.

Q. Okay. And do you find these to be a reliable source of evidence for use in your economic analysis?

A. No, absolutely not.

Q. Why not?

A. A variety of reasons, but one that we mentioned earlier today, which seems very important, is that, again, by their mechanism, by their design, you might say, but not the intention, but by their design -- maybe it was their design, but it's the way they were -- they were kept secret.

The fact of the blacking out of the music of a record company was not divulged to the listeners themselves, to those listening into the service, and it was not divulged to the label that was actually blacked out.

It was not divulged to the artists whose music was blacked out because there were artists distributed by the record company who was blacked out. And it was also not divulged to the competitors of the service.

Q. Now, Professor, before I have you go on, can we just pull the demonstrative really quickly? And my understanding was that we could have restricted information up during the public session, so long as the witness didn't reveal its contents. But I was informed of a technical issue. I just want to double-check this with our host.

MR. WARREN: Are there any attendees present right now that would be able to see the demonstrative? If so, I believe we would have to -- to remove them so that we can put the demonstrative back up and stay in open session.

MR. SACK: There is only one person on the list today and that person is not in the room, in the attendee room.

MR. WARREN: All right. Very well. So I think then we should be confident in putting this back up and remaining in open session, is that correct, from the host?

MR. SACK: That is correct. Thank you.

MR. WARREN: All right. So we can put this back up.

BY MR. WARREN:

Q. Professor, I apologize for that technical digression there. So let me just -- help us unpack this.

Why does it matter to you that the LSEs were kept secret from listeners?

A. In the real world it's clear that the news that a Pandora-like service had a particular major record company, or an Indie, but especially a major, blacked out would truly be likely to have an impact on the listeners and on the labels and on the artists and on the competitors to the service.

Listeners might be -- would be expected to feel that their service were degraded by the absence of a major label's music, and the label itself would certainly be upset about losing the flow of royalties because its plays are being blacked out, so it would be upset about that and try to take measures to either persuade the experiment to end or to bring marketplace pressure on the service or try to find alternatives that would be marketed and broadcasted to move people over, away from a Pandora-like service, if it insisted on the blackout, and move as many of Pandora's listeners over to alternative services where that label's music would be available.

And likewise the artists, being bereft of their share of the royalties, as well as the credit, the professional development that they would experience from more availability of their music, they would be applying whatever pressure they could both to their label and to the service itself.

And competing services would certainly find it in their economic interests to market themselves as actively as they could under the rubric of, hey, we've got all the labels' music and Pandora does not and so why don't you folks come and do your listening with us instead of with Pandora, which is now degraded substantially in terms of the assessed quality of its offerings.

All of those effects would presumably have an impact on how much in the way of plays would be lost in the event that, in reality, there were an important major record company blacked out from Pandora, but all of those effects are missing from the LSEs, from the results of the LSEs because they were kept secret.

Q. Professor, are the results of the LSEs statistically different from zero?

A. No. According to Dr. Reiley, he looked at the results from a statistical point of view. And I just want to say one or two things about that because it's important, not just to the answer to this question, but also something that should be coming up.

So these measurements of the lost plays were conducted daily. And so every day or every short spell of time had its own loss of music plays collected as a matter of data. And since there is a lot of days, there is three months worth of days, so there is some 90 days, just as an example, that means there were 90 different observations of what the lost plays would be per day.

So that generates a whole statistical distribution of data. And one can look at the average across all those 90 days, and also look at how much they vary from day to day, and then one can adduce, using basic statistics, what's the variance and what's the standard deviation among those daily observations.

And that allows the analysts, without a great deal of sophisticated statistics, to say: Okay, what's the confidence interval around the measurement of the average lost of plays on a daily basis?

And if zero is within a confidence interval of the actual measured average, then we say as a matter of the use of statistics that, even though the average might be positive, it's not statistically significantly different from zero because zero was within the confidence interval.

And as reported by Dr. Reiley, that was the case, that, first of all, there were very small measures of the average loss of plays over the entire pendency of the LSEs. And not only were they small, with one exception that I would like to mention, not only were they small, they weren't statistically different from zero.

Q. And what is the exception that you wanted to mention?

A. The exception is that when Universal was the blacked-out label --

CHIEF JUDGE FEDER: I think we are still in --

MR. MARKS: We need to go off the record.

CHIEF JUDGE FEDER: Yeah.

MR. MARKS: Yeah, I think we need to restrict this if we're going to have this risk.

MR. WARREN: Yeah, that's fine. Let's close the courtroom.

CHIEF JUDGE FEDER: Okay. And this will be for the remainder of the day, because we've got less than 15 minutes left.

MR. WARREN: Let's just do it for the remainder of the day, yes.

CHIEF JUDGE FEDER: All right. So we will go into restricted session for the remainder of the day. The host will please clear the virtual courtroom and turn off the public feed.

MR. SACK: Thank you, Your Honor.

CHIEF JUDGE FEDER: And we will see our members of the public tomorrow.

MR. SACK: Please stand by.

(Whereupon, the trial proceeded in confidential session.)

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RICHARD WILLIG		
By Mr. Warren	303	

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CONFIDENTIAL SESSIONS:

351-359, 436-481, 509-541, 554-567, 578-597

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CERTIFICATE

I certify that the foregoing is a true and accurate transcript, to the best of my skill and ability, from my stenographic notes of this proceeding.

8/5/20

Date Signature of the Court Reporter

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