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APPLE INC.

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SAN JOSE DIVISION

THE APPLE iPOD iTUNES ANTI-TRUST LITIGATION.

Case No. C 05-00037 JW
C 06-04457 JW

EXPERT REPORT OF DR. MICHELLE M. BURTIS

Date: October 5, 2009
Time: 9:00 A.M.
Place: Courtroom 8, 4th floor

I. BACKGROUND AND EXPERIENCE

1. My background and experience are summarized in my expert report of June 17, 2009 in the indirect purchaser case.[1] This report is attached as Exhibit A. My hourly rate is $540.

[1] Expert Report of Michelle M. Burtis, Ph.D., *Apple iPod iTunes Antitrust Litigation*, Case No. C 07-6507 JW (RS), June 17, 2009, ("Burtis Indirect Purchaser Report").

II. INTRODUCTION

2. I was the economic expert for Apple in the indirect purchaser case. In that case, I was asked to address whether the econometric analysis proposed by plaintiff's expert, Dr. French, was a valid methodology to demonstrate antitrust impact and measure damages to proposed class members. My conclusion was that Dr. French had not shown that a regression model would work here and that based on my analysis to date his proposed regression models would not work.

3. In my report in the indirect purchaser case, I explained how the regression models work[2] and described several flaws in Dr. French's regression models, including the inability of his models to distinguish the effects of the challenged conduct from the effects of other competitive supply and demand factors and the inability of his models to distinguish between the periods before and after the challenged conduct.[3] I showed that Dr. French had not identified or quantified key variables and had collected little if any data. In my testimony at the evidentiary hearing on June 30, 2009, I contrasted Dr. French's flawed regression approach with a successful regression model I had constructed elsewhere to deal with crude oil prices in the aftermath of Hurricane Katrina. As I described, one of the reasons I was able to reliably estimate a regression model there was that sufficient data were available before the hurricane struck. A copy of the transcript of that hearing is attached as Exhibit B.

4. The Court denied the indirect purchasers' motion to certify a damages class under Rule 23(b)(3) on July 17, 2009. The Court found that "Dr. French's testimony was limited to making unspecified proposals as to how he might be able to prove damages, while Dr. Burtis's testimony showed the significant challenges that Dr. French would face in carrying out his proposals. Dr. French has proffered no specific economic model and has examined no set of data, and has never accomplished what he purports to accomplish in an indirect purchaser antitrust class action."[4]

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[2] Burtis Indirect Purchaser Report, pp. 4-7.

[3] Burtis Indirect Purchaser Report, pp. 3-4, 8-18.

[4] "Order Denying In Part Plaintiff's Motion for Class Certification," *Apple iPod iTunes Antitrust Litigation*, Case No. C 07-6507 JW (RS), July 17, 2009, p. 12.

III. ASSIGNMENT

5. Counsel for Apple has asked me to address whether the methodologies proposed by Professor Noll in the direct purchaser case can be used to estimate class-wide damages.[5]

6. A list of material that I considered in preparing this report is attached as Exhibit C.

7. I summarize my conclusions in Section IV and describe the basis and reasons for my conclusions in Sections V and VI.

IV. SUMMARY OF CONCLUSIONS

8. Professor Noll has proposed three approaches for estimating damages: "before-after," "yardstick," and "mark-up." Dr. French proposed the same three basic approaches: "temporal competitive benchmark," "yardstick competitive benchmark," and "margin analysis."[6] Professor Noll's proposed methods suffer from the same basic flaws this Court found in Dr. French's three methods. Like Dr. French, Professor Noll has not developed any actual model or provided sufficient information about his proposed methods to demonstrate that these methods would work. On the contrary, as I discuss below, his testimony shows he is doubtful that certain of these methods can work. Further, like Dr. French, he has not collected any data or shown that data exist to implement these methods. He has not identified or quantified the specific variables he will use to estimate damages. He has written no equations. He has proposed no solutions to the numerous obstacles that his proposed methodologies create.

9. Professor Noll's first method for estimating damages is the "before-after" method. He proposes using regressions to "compare iPod prices before and after April 2003."[7] This approach suffers from the same basic flaws as Dr. French's "before-during" or "temporal competitive benchmark" method. The purported baseline period before the alleged violation is too short; most of the iPod models at issue were not even sold during that period; the differences

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[5] Declaration of Roger G. Noll, Ph.D., July 15, 2008 ("Noll Decl."); Deposition of Roger G. Noll, Ph.D., September 19, 2008 ("Noll Dep.").

[6] Affidavit of Gary L. French, Ph.D., February 23, 2009 ("French Affidavit"), pp. 34-37.

[7] Noll Decl., p. 55.

among the models and their prices are vast; and pricing in this nascent, dynamic industry was affected by too many complex factors that cannot be measured. Professor Noll does not explain how he would estimate the difference in prices between the proposed class period and the "before" period, while controlling for the relevant supply and demand factors. Nor has he proposed a method to determine the dividing line between the "before period" and the period when the conduct at issue allegedly had any effect on pricing.

10. Professor Noll's "yardstick" method, like Dr. French's "yardstick competitive benchmark," would require him to identify products in another market that are sufficiently similar to each of the iPod products in features, functionality, design and costs that they could be used as an appropriate benchmark to determine what the price should have been for each of the iPods absent the alleged anticompetitive conduct. But he has not shown that any products meeting his test exist. To the contrary, he admitted in his deposition that he has doubts about his yardstick method and he conceded that the necessary data may not be available.[8] I believe that Professor Noll's doubts are well founded. Based on my analysis to date, I do not believe this method will work.

11. Professor Noll's third proposed method is to estimate damages by comparing the actual mark-ups (*i.e.*, the difference between price and cost) of iPods to mark-ups for some competitive products. This approach is effectively the same as the yardstick method and faces all the pitfalls of that method.

12. In addition, all three of Professor Noll's proposed methodologies, like those of Dr. French, fail to analyze whether any purchaser paid a net overcharge. He ignores the prices of iTunes Store music even though, under plaintiffs' theory, if iPod prices were higher because of the alleged violation than they would have been in the but-for world (*i.e.*, the world absent the alleged anticompetitive conduct), iTunes Store music prices may have been lower. If so, individuals with large iTunes Store music purchases relative to their iPod purchases may not have paid any *net* overcharge under plaintiffs' theory and thus suffered no injury.

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[8] Noll Dep., pp. 72-73.

V. PROFESSOR NOLL'S PROPOSED METHODS WILL NOT WORK

13. Professor Noll proposed three approaches to estimate competitive benchmark prices: "before-after," "yardstick," and "mark-up."[9] As I discuss below, Dr. French proposed these same basic approaches[10] and each suffers from the same basic flaws this Court found to exist in Dr. French's methods. In addition, Professor Noll, like Dr. French, has not collected any data or shown that common data exist to measure all the relevant supply and demand factors.

A. Professor Noll's "Before-After" Method Will Not Work

14. Professor Noll proposes a "before-after" method for estimating damages, which suffers from the same basic flaws as Dr. French's "before-during" or "temporal competitive benchmark" approach.[11] Professor Noll proposes using regressions to "compare iPod prices before and after April 2003."[12] He asserts that his "before-after" regression approach would attempt to quantify the price effect of the challenged conduct by estimating the difference between prices in the proposed class period and prices in the "before" period, while controlling for factors such as "product features, input costs, . . . the stage of the product in its life-cycle . . . [and the] number of permanent downloads that are available on iTMS."[13]

15. As discussed in my June 17, 2009 report, where this type of regression framework is used, it generally includes explanatory variables such as the relevant competitive supply and demand factors along with a "dummy" variable. As I explained, a dummy variable is given a value of zero when it is "off," *i.e.*, before the misconduct occurred, and a value of one when it is "on," *i.e.*, during the misconduct period. The regression estimates a number or a "coefficient" for the dummy variable, reflecting the number of units, or the percentage, by which the price is higher (or lower) when the dummy variable is on, while controlling for other factors.[14] In other

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[9] Noll Decl., p. 17.

[10] French Aff., pp. 34-37.

[11] French Aff., pp. 35-37.

[12] Noll Decl., p. 55.

[13] Noll Decl., p. 55; Noll Dep., p. 70.

[14] Burtis Indirect Purchaser Report, pp. 4-8.

words, the dummy variable in such a regression model is intended to attempt to measure the difference between average prices in the class period and average prices outside the class period, controlling for the other variables in the equation, assuming this type of analysis can be used at all in the particular circumstances.

16. However, Professor Noll questioned whether he would use a dummy variable in his regression model to measure the difference between average prices in the class period and average prices outside the class period.[15] Neither in his declaration nor in his deposition has Professor Noll specified any methodology that would *not* rely on a dummy variable but would allow him to quantify the effect of the challenged conduct on prices.

17. I am not aware of any valid before-and-after regression method that could determine damages given the realities of the varying products at issue here as well as the relatively few price changes in the products over time. In fact, as discussed in my June 17, 2009 report, I believe that a "before-after" regression model or a "temporal competitive benchmark" analysis would not work here. To obtain a robust and accurate measure of any alleged overcharge, a regression model must be able to account for all of the important factors relevant to determining iPod prices. Otherwise, it has no probative value. The effect of omitted factors or variables is well known in the econometrics literature.[16] At his deposition, Professor Noll agreed that it is important to control for all these factors.[17] Moreover, a key assumption in the "before-after" regression method is that the relationship between prices and their determining factors (other than the alleged misconduct) is known and remains the same.[18] For example, if price is

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[15] Noll Dep., p. 198.

[16] For example: "the omission of relevant variables can bias the results. If, for example, costs were high during those periods of alleged wrongful behavior because of the influence of variables not included in the regression model, or if demand grew more inelastic during that period in ways not captured by the included demand-side variables, then a dummy variable reflecting the likely effect of wrongful behavior might have a large positive coefficient for reasons unrelated to the existence of the alleged conspiracy." Daniel L. Rubinfeld, *Quantitative Methods in Antitrust, in* 1 Issues in Competition Law and Policy 723 (ABA Section of Antitrust Law 2008), p. 726.

[17] Noll Dep., p. 70.

[18] Burtis Indirect Purchaser Report, pp. 12-14.

assumed to depend on cost and demand changes, it is assumed that price reacts similarly to cost changes, or demand changes, in both the "before" and "after" periods. Without this stability, the model is mis-specified and any estimate of the impact of the alleged violation is invalid.

18. These critical requirements for a valid before-after comparison are absent here. As explained in my June 17 report, the relevant supply and demand factors that determine iPod model prices include such things as their capacity, weight, size, design, screen-size, ability to display video or photos, battery life, color, operating system, software capabilities and other product characteristics as well as other market factors.[19] However, similar to Dr. French, Professor Noll has not collected any data or shown that common data exists to measure these factors. Indeed, although Professor Noll conceded (as did Dr. French[20]) that factors such as purchasers' attachment to iPods and "coolness" (*i.e.*, the perception that the iPod is a "cool" product) affect demand, he does not propose any specific method for measuring them.[21] This inability to account for an important determinant of prices would bias an estimate of the alleged overcharge. Similarly, to the extent Professor Noll is not able to measure and control for any other relevant demand or supply factors, or other types of factors such as Apple's pricing strategy, in his regression model, that will further bias his results. Apple's pricing strategy may be more complex than the model envisioned by Professor Noll. Apple's prices of particular iPod products remain constant for relatively long periods of time, when demand and supply factors may be changing. A model that includes demand and supply variables will show that those variables do not influence Apple's prices, but without some explanatory variable to capture Apple's strategy, the model will fail to explain prices at all.

19. Moreover, like Dr. French, Professor Noll has not shown that the required stability in the relationship between iPod prices and the relevant supply and demand factors in both the "before" and "after" periods exists here, and I do not believe it does. The period before the

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[19] Some of these factors are depicted in Exhibit D, a demonstrative I used at the June 30 evidentiary hearing.

[20] French Dep., p. 125.

[21] Noll Dep., p. 86.

alleged violation was too short and most of the iPod models at issue were not even sold before April 2003. The first generation of iPod was introduced in October 2001,[22] just 1.5 years before the alleged violation in April 2003. Exhibits 8 and 9 in my June 17 report show that only the first three generations of the original iPod were sold during or before April 2003.[23] The rest of the 43 iPod models—including the iPod photo, video, touch, nano and shuffle—were all sold only during the proposed class period.[24] Exhibits E and F to this report are demonstratives I used at the June 30 evidentiary hearing to show the limited price data available in the alleged before period, as compared to the prices charged for the numerous different models sold during the alleged class period.

20. The later iPods sold during the class period differ dramatically in their characteristics, technical capabilities and features from those sold during the asserted "before" period. The importance of these dramatic differences is that to the extent certain features were not present in the "before" period, Professor Noll's proposed "before and after" model is incapable of distinguishing any effect on prices due to the alleged conduct from the effect of a product feature introduced in the class period. Here, the original iPods were substantially larger, heavier, and had less capacity than the models that followed, and the products introduced later were much more advanced with many entirely new features and technical capabilities.[25] In addition to playing music, for example, the iPod touch allows users to play video games, watch videos and full–length feature movies, send and receive e-mail, store and view photographs, and access the internet with wi-fi capability. iPod touch users can wirelessly download applications from the Apple App store, which offers over 65,000 different software products for the iPod

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[22] *See* http://www.everymac.com/systems/apple/consumer_electronics/stats/ipod.html

[23] Apple iPod mini 4GB was introduced on January 6, 2004. *See* http://www.everymac.com/systems/apple/consumer_electronics/stats/ipod_mini.html.

[24] *See* Exhibit 8 in Burtis expert report of June 17, 2009; also, see Exhibit 9: "Apple Introduces iPod Photo," Apple press release, October 26, 2004; "Apple Introduces iPod shuffle," Apple press release, January 11, 2005; "Apple Introduces iPod nano," Apple press release, September 7, 2005; "Apple Unveils iPod touch," Apple press release, September 5, 2007.

[25] *See* http://web.archive.org/web/20011217064651/www.apple.com/ipod/specs.html (*see* Exhibit 3 in Burtis expert report of June 17, 2009).

touch.[26] The iPod touch has a 3.5 inch widescreen display and "multi-touch interface," allowing users to "pinch" the screen to make images larger or smaller or "flick" the screen to change the image. It automatically senses when its position changes and rotates the image to a landscape position. The original iPods had none of these additional features and functions. The iPod touch is 8 millimeters thick, less than half the thickness of the original iPod.[27] To take another example, as innovative as the original iPod was, the iPod nano was hailed in its own right in 2006 as "irrevocably alter[ing] the landscape for portable audio players." It took "clean design aesthetics to a new level [and] brought us the first high-capacity (4GB) flash-based player—and one priced within reach of the masses, no less."[28]

21. There were significant variations in iPod prices and these variations in prices changed over time. For example, in 2003 Apple sold a 15GB iPod with a black-and-white screen and no video capabilities at a retail price of $399.[29] Compare that to a 16GB iPod touch that is now sold for three-quarters the price ($299), with all of the latest features as discussed in the preceding paragraph.[30] Compare those to the iPod shuffle, now sold for $79, which weighs less than half an ounce and has no display at all, but instead a "voice" that indicates the song and identity of the performer.[31] The different prices charged for different iPod products demonstrate the importance of the varying features of the products and the difficulty of accounting for the different features in any model of but-for iPod prices.

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[26] *See* http://www.apple.com/pr/library/2009/07/14apps.html

[27] See, for example, "Apple Unveils iPod touch," Apple press release, September 5, 2007 (Exhibit 9 in Burtis expert report of June 17, 2009).

[28] 2006 PC World Innovations Awards, ABC News (Exhibit 10 in Burtis expert report of June 17, 2009).

[29] "Apple Introduces New iPods," Apple press release, April 28, 2003 (Exhibit 9 in Burtis expert report of June 17, 2009).

[30] "Apple Introduces New iPod Touch," Apple press release, September 9, 2008 (Exhibit 9 in Burtis expert report of June 17, 2009).

[31] "Apple Announces Incredible New iPod Shuffle," Apple press release, March 11, 2009 (Exhibit 9); http://www.apple.com/ipodshuffle/specs.html (Exhibit 3 in Burtis expert report of June 17, 2009).

22. As with Dr. French's proposal, Professor Noll's before-after approach is also flawed because he has not proposed any method to determine the dividing line between the baseline, or the "before," period and the period when the conduct at issue allegedly had any effect on pricing. He asserts that he will compare prices before and after April 2003, when the iTunes Store was launched. But plaintiffs' theory is that Apple's prices became elevated, not when the iTunes Store was launched, but rather later when a sufficiently large number of customers acquired a sufficiently large number of DRM-encoded songs that they became locked in and, as a result, began to purchase additional iPods rather than competing players.[32] Professor Noll does not address how he will determine that date. The lack of a reliable method to distinguish the "before" period from the class period and assess the effect of the challenged conduct on prices is another reason he cannot validly determine the existence or amount of any damages.

B. Professor Noll's Yardstick Method Will Not Work

23. Professor Noll's "yardstick" method would "compare prices for the reference product with prices of other products that have similar costs and functions but that are sold in markets unaffected by the alleged conduct."[33] This is essentially the same approach as Dr. French's proposed "yardstick" method.[34] Professor Noll's own criteria for validity of yardstick products is that they must be: (i) "technically and functionally similar to iPods" and (ii) "subject to similar underlying market forces except for the effects of the anticompetitive acts," which he said means they must be "sold in markets not affected by anticompetitive acts."[35]

24. Professor Noll understands and has admitted the limitations of this approach. In his deposition, he said he is "least happy about" this method and that he "has more doubts that that one [yardstick] will work than the other two [before-after and mark-up]."[36] He said that the

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[32] Reply Memorandum in Support of Plaintiffs' Motion for Class Certification and Appointment of Class Counsel at p. 11.

[33] Noll Decl., p. 17.

[34] French Aff., p. 35.

[35] Noll Decl., pp. 17, 56.

[36] Noll Dep., pp. 72-73.

"hangup[] is identifying the comparative products."[37] In addition, he acknowledges that this approach depends on his ability to gather from third parties data on "prices, technical specifications and manufacturing costs during the class period"[38] and that "[c]ollecting and analyzing this information would be a major undertaking in terms of complexity, time, and costs."[39] He has not made any attempt to undertake this difficult task. Indeed, he admitted that his approach "requires data that I'm not sure exists."[40]

25. Professor Noll's doubts that he can successfully use this approach are well founded. Professor Noll has identified four candidates for his yardstick comparison,[41] but he provides no economic analysis to show that these yardstick products satisfy his own criteria for validity of a yardstick product. He proposes, for example, to use personal digital assistants (PDAs). But Professor Noll has produced no evidence or examples of PDAs that are comparable to even the original iPods in terms of digital storage capacity, functionality, user interface, size, battery life and design. And Professor Noll admits that PDAs do not have sufficient storage capacity to be used as a digital media player.[42] Nor are PDAs comparable to the later iPod models such as the shuffle and mini (which are used only for playing music) or the iPod touch (which, as discussed above, has a wide variety of uses far beyond what any PDA offers). Professor Noll has similarly failed to show that his other proposed yardstick products—smart mobile telephones, portable CD/DVD players and portable digital players produced by Apple's competitors—satisfy his criteria. He offers no economic analysis to show they have similar costs and functionalities and face similar underlying market forces as iPods. Nor does he show that any of these products have sufficiently similar counterparts to each of the wide variety of iPod

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[37] Noll Dep., p. 72.

[38] Noll Decl., p. 58.

[39] Noll Decl., p. 58.

[40] Noll Dep., p. 73.

[41] Noll Decl., pp. 56-57.

[42] Noll Decl., p. 57.

models, ranging from the original iPods with their relatively small capacity and limited features to products like the current iPod nano, iPod shuffle and iPod touch.

26. Professor Noll is apparently uncertain whether another of his proposed yardstick candidates—other personal media players—would or would not be appropriate. On the one hand, Professor Noll explains that "[n]ormally other products that are sold in the same market can not be used as yardsticks for a reference product."[43] On the other hand, Professor Noll speculates that "conceivably, this case could be an exception."[44] But he has not investigated that issue and offers no opinion that this case is in fact an exception. Whether or not other personal media players could be a yardstick is left unresolved by Professor Noll.

27. Professor Noll has not shown that his yardstick approach will work and, based on my analysis to date, I do not believe it will.

C. Professor Noll's Mark-Up Method Will Not Work

28. Professor Noll's third proposed method to estimate damages is based on a comparison of actual mark-ups on iPods to mark-ups in the but-for world.[45] To determine mark-ups in the but-for world, he offers two possible approaches. One approach is to use what Professor Noll would consider "typical mark-ups" in the consumer electronics industry and/or Apple's mark-ups in other competitive markets as estimates of iPods' mark-ups in the but-for world. The second approach is to rely on a game theoretic model to estimate mark-ups in the but-for world.

29. Professor Noll's proposal to use "typical mark-ups" in the consumer electronics industry and/or Apple's mark-ups in other competitive markets as yardsticks or benchmarks is effectively the same methodology as his yardstick method and faces all the problems of the yardstick method. As discussed earlier, the validity of a competitive benchmark market critically hinges on the competitive benchmark being similar to the market at issue in all material ways

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[43] Noll Decl., p. 57.

[44] Noll Decl., p. 57.

[45] Noll Decl., pp. 17, 58-59.

except for the challenged conduct.[46] Indeed, this approach poses even greater difficulties because, to determine mark-up (which is the difference between the cost of a good or service and its selling price), Professor Noll must estimate not just but-for prices but also but-for costs. Just as with his yardstick approach, Professor Noll does not identify any product that could be an appropriate benchmark. He says only that he will look at "typical mark-ups" in the "consumer electronics" industry, which includes everything from big-screen televisions to digital cameras to GPS navigational systems. He does not explain how the profit that Samsung makes on a plasma TV or that Tom Tom, a GPS navigation system seller, makes on a GPS system can provide any basis for estimating the competitive price of iPods. He suggests that Apple's consumer products other than iPods could provide a benchmark. Again, however, he does not specify which of Apple's products in other markets he would consider and whether such products would satisfy the criteria to be yardstick products. As mentioned earlier, Professor Noll admitted in his deposition that he has doubts about whether the yardstick method would work.[47] For the same reasons that applied to the yardstick approach, I do not believe this mark-up method will work.

30. Professor Noll proposes comparing the actual mark-ups for iPods to mark-ups from "a game theoretic model of price formulation in the relevant market."[48] Under this approach, he proposes to first "deduce" what the level of market concentration would have been in the market in which iPods are sold absent the alleged misconduct by looking at "the extent of concentration in other consumer electronic markets."[49] Then he would apply a "theoretical model" to decide what the prices would have been in this hypothesized market.[50]

31. This approach is flawed at both steps. As to the first step, the approach is flawed for the same reasons discussed above. Professor Noll has not identified any "consumer electronic

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[46] Noll Decl., pp. 17, 56.

[47] Noll Dep., pp. 72-73.

[48] Noll Decl., p. 58.

[49] Noll Decl., p. 59. Market concentration refers to the number of competing firms in a given market and the relative size of their respective market shares. In general, the smaller the number of firms and the greater their market shares, the more concentrated the market is.

[50] Noll Decl., p. 59.

market" at all, let alone one that is sufficiently similar to the market in which iPods are sold to accurately "deduce" what the market concentration should have been. And if he could identify such a market, he provides no basis to think that the iPod's share of its market should be the same as another company's share of whatever other market he may pick.

32. As to the second step, Professor Noll's approach is flawed because he has not identified any "game theoretic" model that could be used to predict prices in a market of the kind at issue here. "Game theoretic" models are theoretical models of interactive decision-making, where the outcome for one participant (or "player") can depend on the actions of all other participants. An individual player chooses a strategy taking into account the choices of other players. But, in thinking about the possible choices, the individual player might recognize that all other participants are also considering his choice, which that individual player must also take into account. Professor Noll's reference to "price formulation" apparently refers to the possible strategies Apple would choose in determining the price of iPods in the but-for world, taking into account the prices and price responses of its rivals in the but-for world.

33. But Professor Noll has not identified any model that could be used to predict Apple's prices. Professor Noll has pointed to a particular game theoretic model, the Cournot model. The Cournot model typically is described as a model in which firms take rivals' decisions as fixed and prices are then determined by the number of firms or the market share of firms in a given market. This model also typically assumes that all firms produce a homogeneous product (that is, there is no product differentiation), the number of firms is fixed, as well as other assumptions. Professor Noll's proposal apparently is to construct some type of Cournot model, as yet unspecified, where Apple makes decisions assuming its competitors' decisions cannot change, and where Apple's prices depend on its market share or on market concentration, more generally. Professor Noll, however, has done no analysis to support using a Counot game theoretic model here. There is no evidence that Apple sets prices consistent with the underlying assumptions of this game theoretic model, or any other model. Given that Professor Noll has done no work here, he cannot legitimately claim that his proposed model would be appropriate for different iPod models or different time periods where different competitors exist or have different strategies.

34. When asked in his deposition whether he had done this type of analysis in another case, Professor Noll answered he had not done so in another case but that he had used Cournot models in a published paper.[51] Professor Noll's paper on competition among natural gas pipelines titled, "Relative Prices on Regulated Transactions of the Natural Gas Pipelines," relies on a theoretical Cournot model which assumes a market where products from different manufacturers are homogenous and they are all sold at a single market price.[52] Any characterization of prices based on such a theoretical model would only be valid if the assumptions of this model hold. For these assumptions to hold for iPods, Apple would have to sell a single iPod model with a set of features, design, and capabilities that do not change over time. Moreover, Apple's competitors' products would also have to be identical to this iPod model. The assumptions underlying the simple theoretical model in Professor Noll's paper clearly do not hold in the case of iPods. As discussed above, iPods differ significantly in terms of prices, features, characteristics, and how consumers perceive these models relative to each other and relative to other portable digital media players.

35. Professor Noll has failed to specify a game theoretic model of differentiated products that accounts for the economic realities of the market in which iPods are sold.

VI. PROFESSOR NOLL'S METHODOLOGIES DO NOT CONSIDER THE OVERALL EFFECT OR NET INJURY TO INDIVIDUAL PROPOSED CLASS MEMBERS

36. Professor Noll's proposed methods are similar to Dr. French's proposed methods in that all three methods fail to account for the overall effect or net injury to individual proposed class members. As explained in my June 17, 2009 report, plaintiffs' theory is that Apple's use of

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[51] Noll Dep., p. 119. Professor Noll testified that he used the Cournot model in two papers. He described one of the papers as relating to intellectual property rights. If he was referring to his paper titled, "Intellectual Property, Antitrust and the New Economy," this paper does not analyze a Cournot model. Linda R. Cohen and Roger G. Noll, "Intellectual Property, Antitrust and the New Economy," University of Pittsburgh Law Review 62(3) (Spring 2001): 453-73.

[52] Paul W. MacAvoy and Roger G. Noll, "Relative Prices on Regulated Transactions of the Natural Gas Pipelines," Journal of Economics and Management Science 4(1) (Spring 1973): 212-234.

proprietary DRM for its music store increased the demand and therefore prices for iPods. It would follow from plaintiffs' theory that some consumers would have elected not to purchase iTS music for the same reason and, to that extent, the demand for and price of iTS music would have decreased due to the use of DRM. Accordingly, to determine whether any consumer paid a **net** overcharge would require an analysis of both the prices of iPod products and the price of iTS music. For example, depending on the amount of any iPod "overcharge" and the amount of any iTS music "undercharge," whether an individual paid a net overcharge would turn on the number of iPods and music files purchased by that individual. Individuals with sufficiently large purchases of music relative to iPods would not have paid a net overcharge, even under plaintiffs' theory and even if they could establish an iPod overcharge. None of Professor Noll's three methods, like Dr. French's three approaches, addresses this issue.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true to the best of my knowledge and belief. Executed on August 31, 2009 in Washington, D.C.

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Michelle M. Burtis, Ph.D.

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