STEPTOE & JOHNSON LLP
ATTORNEYS AT LAW

Pantelis Michalopoulos
202.429.6494
pmichalo@steptoe.com

FILED/ACCEPTED

JAN 14 2011

Federal Communications Commission
Office of the Secretary

1330 Connecticut Avenue, NW
Washington, DC 20036-1795
Tel 202.429.3000
Fax 202.429.3902
steptoe.com

REDACTED – FOR PUBLIC INSPECTION

January 14, 2011

Via HAND DELIVERY

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Applications of Comcast Corporation, General Electric Company and NBC Universal, Inc. for Consent to Assign Licenses or Transfer Control of Licenses, MB Docket No. 10-56

Dear Ms. Dortch:

DISH Network L.L.C. ("DISH"), through counsel, submits the accompanying redacted version of economic analysis prepared by Professor Simon J. Wilkie on an important and particularly troubling issue raised by the proposed transaction. The issue is the risk that an unaffiliated distributor's loss of two networks is worse than the sum total of the effects from the loss of each network standing alone, meaning that the accumulation of programming in the hands of Comcast will give that company even greater power than if the risk of foreclosure were merely additive. Professor Wilkie has confirmed the magnitude and severity of this risk by studying the temporary foreclosures of the Fisher broadcast stations suffered by DISH. His findings have significant implications across the swath of waterfront properties with which this deal will endow Comcast, including a veritable arsenal of "marquee" cable networks.

As a threshold matter, it is sensible to expect that the foreclosure of a distributor from two channels has a greater effect than would each standing alone. The loss of each of these channels can be expected to result in the loss of the more ardent members of its audience, so that the loss of both will result in the loss of both of their "core" fan bases. In addition, however, the foreclosure of two channels can be expected to cost the distributor losses among those viewers who can live, perhaps grudgingly, with the loss of one, but for whom the loss of two is no longer tolerable. The two would thus cost the distributor more than twice the loss of each unless the

two stations have committed fan bases that are overlapping to a very significant degree. Mr. Wilkie's analysis confirms empirically this intuitively sensible hypothesis. The Fisher incident is particularly suitable for this test because in some areas it deprived DISH of only one broadcast station even as it deprived DISH of two stations in other markets.

Specifically, Professor Wilkie found:

- DISH's net subscriber "churn" in a given local market when Fisher withheld two different stations was more than *twice* DISH's net churn in a given local market when Fisher withheld one station.

- Comcast's ability to withhold multiple networks, resulting from the transaction, will in turn bring about higher prices for retransmission consent and cable network carriage than if the deal only gave Comcast the ability to withhold one, albeit popular, source of content.

These conclusions support an important inference about so-called "marquee" national cable networks. It is reasonable to infer that the loss of two of these networks will have a greater effect than twice the foreclosure of each standing alone. This holds particularly true since the waterfront cable properties that Comcast will accumulate through this deal, including USA Network, CNBC, Syfy and MSNBC, have core fan bases are not likely to overlap to a significant degree. This in turn suggests that the potential withholding of Comcast's cable networks needs to be the subject of especial vigilance on the part of regulators.

Professor Wilkie's analysis contains proprietary and highly confidential information that has already been found to be covered under the *Second Protective Order* in this proceeding. We are therefore filing it under the *Second Protective Order* adopted by the Commission for this proceeding.[1] Pursuant to the procedures established in that protective order, two copies of the redacted and three copies of the highly confidential are being filed with the Commission. The redacted copies accompany this letter.

Please do not hesitate to contact us if you have any questions regarding this submission.

---

[1] Applications of Comcast Corporation, General Electric Company and NBC Universal, Inc. for Consent to Assign Licenses or Transfer Control of Licenses, MB Docket No. 10-56, *Second Protective Order*, DA 10-370 (rel. March 4, 2010).

Sincerely,

/s/
Pantelis Michalopoulos
Christopher Bjornson
Counsel for DISH Network L.L.C.

cc: Vanessa Lemmé

Attachments

REDACTED – FOR PUBLIC INSPECTION

REPORT OF PROFESSOR SIMON J. WILKIE

HORIZONTAL PRICE EFFECTS OF THE PROPOSED COMCAST/NBCU TRANSACTION

REDACTED – FOR PUBLIC INSPECTION

Table of Contents

I. INTRODUCTION

A. *Qualifications*

1. My name is Simon J. Wilkie. I am the Chairman of, and a Professor in, the Department of Economics at the University of Southern California, as well as Executive Director of the Center for Communication Law and Policy at the University of Southern California Law School and a (Courtesy) Professor of Communication. Prior to joining the faculty at the University of Southern California, I was a Senior Research Associate in Economics at the California Institute of Technology. From 1990 to 1994, I held the position of Member of the Technical Staff at Bell Communications Research Inc. ("Bellcore"), the research arm of the Bell Operating Companies. From 2007 through 2009, I sat on the program committee of the Telecommunications Policy Research Conference. I currently serve on the editorial board of the *International Journal of Communication.* I have also been an Affiliated Scholar of the Milken Institute, and a Visiting Assistant Professor at Columbia University.

2. From 2002 to 2003, I served as Chief Economist at the Federal Communications Commission ("FCC" or "Commission"). In that capacity, I oversaw the economic analysis performed by the Commission staff and advised the FCC Chairman and Commissioners on issues involving economic analysis. Major items before the Commission during my tenure included the EchoStar/DirecTV transaction, the Comcast/AT&T Broadband transaction, the Triennial Review of Unbundling Obligations, and the Biennial Review of Media Ownership rules.

3. Over the past twenty years, my academic research has focused on the areas of mechanism design, regulation, and game theory, with a particular emphasis on the

telecommunications industry. I received a Bachelor of Commerce degree in Economics from the University of New South Wales, and M.A. and Ph.D. degrees in Economics from the University of Rochester. My resume, which contains more information on my background and qualifications, is contained in the Appendix. My work on this matter is on-going, and I reserve the right to supplement and modify my report as additional information and data become available.

B. *Assignment*

4. I have been asked by the DISH Network Corporation ("DISH") to analyze whether the proposed transaction between Comcast and NBC Universal ("NBCU") will lead to the exercise of market power through horizontal price effects. I examine this issue by conducting an economic analysis of the effect of channel withholding by the Fisher Broadcasting Company ("Fisher") on DISH's net churn rates.[1] More specifically, my task in this paper is to test empirically an intuitively sensible hypothesis—namely, the proposition that the withholding of two broadcast stations has a greater effect on the distributor deprived than two times the loss of either one of the two. I investigate whether (1) DISH's net churn in a given local market when Fisher withheld two different stations is more than (2) *twice* DISH's net churn in a given local market when Fisher withheld one station. Specifically, my task is to investigate this "super-additivity"[2] of net churn rates from both a theoretical and empirical economic perspective.

[1] The net churn rate for month m is defined as follows: let d be the difference between the number of subscribers stopping subscription in month m and the number of subscribers starting subscription in month m, and let s be the number of customers who were subscribers at the beginning of month m. Then, the net churn rate for month m is equal to d/s.

[2] Suppose that two channels, channel X and channel Y, are withheld simultaneously and let the corresponding net churn rate be C_{XY}. Suppose that the net churn rate when only channel X is withheld is C_X and the net churn rate when only channel Y is withheld is C_Y. Then, the net churn rate is super-additive if C_{XY} is greater than (C_X+C_Y).

C. *Summary of Conclusions*

5. This section summarizes my primary findings and conclusions. Because the report contains a detailed analysis, the following summary does not reflect all of my conclusions or all of the bases for those conclusions. The facts or data upon which I am basing the opinions and inferences reflected in this report are of a type reasonably relied upon by experts in the field of Industrial Organization. My primary conclusions are summarized as follows:

- From December 2008 to June 2009 (the "channel loss period"), Fisher withheld programming from DISH in seven Designated Market Areas ("DMAs").[3] This withholding led to an increase in net churn rates during the channel loss period in these DMAs.

- The net churn rates incurred by the DISH are super-additive in the number of channels withheld when the channels are substitutes.

- In particular, withholding one network channel increased DISH's customer loss { }. Withholding two network channels increased DISH's customer loss { }.[4]

- The existence of super-additive increases in the net churn rates has an important implication for the proposed Comcast/NBCU transaction—*the transaction will create an increase in horizontal market power due to the ability to withhold multiple channels. Moreover, the resulting increase in programming prices will lead to the exercise of vertical market power by raising rivals' costs.*

- Comcast's ability to withhold multiple networks, resulting from the transaction, will in turn bring about higher prices for retransmission consent and cable network carriage than if the deal only gave Comcast the ability to withhold one, albeit popular, source of content.

- These conclusions support an important inference about so-called "marquee" national cable networks. It is reasonable to infer that the loss of two of these networks will have a greater effect than twice the foreclosure of each standing alone. This holds particularly true since the waterfront cable properties that

[3] Designated Market Areas are determined Nielsen Media Research.

[4] Customer loss is computed by analyzing the impact on gross churn rates. The gross churn rate for month m is defined as the number of subscribers stopping subscription in month m divided by the number of customers who were subscribers at the beginning of month m. See Appendix I for the analysis of DISH's gross churn rates.

> Comcast will accumulate through this deal, including USA Network, CNBC, Syfy and MSNBC, have core fan bases are not likely to overlap to a significant degree. This in turn suggests that the potential withholding of Comcast's cable networks needs to be the subject of special vigilance on the part of regulators.

D. Outline of Report

6. Section II offers a brief description of the profiles of DISH and Fisher a nd reviews the retransmission dispute. Charts displaying net churn rates for the 7 DMAs which were subjected to channel withholding are also presented. Section III describes a theoretical model of churn rates. Section IV is an empirical investigation of the impact of channel withholding on churn rates and presents regression results and hypothesis test results. Section V describes the implications of the theoretical and empirical results for antitrust regulation and lists the conclusions of the report. Appendix I contains an analysis of gross churn rates, and Appendix II is a brief description of the statistical tests of the hypotheses in this report.

II. THE DISH–FISHER RETRANSMISSION DISPUTE

A. *Introduction*

7. As a threshold matter, it is sensible to expect that the foreclosure of a distributor from two broadcast stations has a greater effect than would each standing alone. The loss of each of these stations can be expected to result in the loss of the more ardent members of its audience, so that the loss of both will result in the loss of both of those core fan bases. In addition, however, the foreclosure of two stations can be expected to cost the distributor losses among those viewers who can live, perhaps grudgingly, with the loss of one, but for whom the loss of two is no longer tolerable. The two would thus cost the distributor more than twice the loss of each unless the two stations have core fan bases that are overlapping to a very significant degree. I set out to test this intuitive hypothesis.

B. *DISH and Fisher*

8. DISH provides subscription television services. DISH is the third largest pay-TV provider in the United States, with more than 14 million customers. DISH began offering subscription television services in March 1996. DISH programming includes more than 280 basic video channels, 30 premium movie channels, 35 regional and specialty sports channels, 2,500 local channels, 220 Latino and international channels, and 50 channels of pay-per-view content.[5]

9. Fisher is a subsidiary of Fisher Communications Inc., and owns and operates 13 full power television stations, seven low power television stations, and ten owned and managed radio stations in the Western United States.[6]

C. *The Retransmission Dispute*

10. In December 2008, DISH and Fisher were involved in a retransmission dispute which resulted in DISH's inability to retransmit a number of Fisher's major network affiliates. Specifically, during the December 2008 to June 2009 channel loss period, stations were withheld in 7 DMAs. Table 1 shows a list of the DMAs which were subjected to channel withholding by Fisher. The table includes a column which displays whether at least one Unavision affiliate was among the channels withheld in the DMA. On June 10, 2009, Fisher entered into a new multi-year retransmission agreement with DISH.

[5] DISH 2009 Form 10-K.

[6] Fisher Communications Inc., 2009 Form 10-K.

TABLE 1
LIST OF DMAS SUBJECTED TO CHANNEL WITHHOLDING BY FISHER

Designated Market Area (DMA)	Primary Channel Withheld	Second Affiliate Withheld
Bakersfield, CA	CBS	Fox
Boise, ID	CBS	N/A
Eugene, OR	CBS	N/A
Idaho Falls, ID	CBS	N/A
Portland, OR	ABC	Univision
Seattle, WA	ABC	Univision
Yakima, WA	CBS	Univision

11. We will identify three types of channel-withholding scenarios: (1) only one "Top 4"[7] Network channel is withheld; (2) two "Top 4" Network channels are withheld and neither is a Univision affiliate; and (3) two channels are withheld and one of the two is a Univision affiliate. In scenario 3, the two channels withheld are not substitutes for each other. The objective of the analysis is to identify the impacts of channel withholding on churn in each of these three scenarios. In particular, our prior assumption is that, although Univision is the 5th highest rated broadcast network, as a Spanish language channel, it is most likely to have highest-value viewers who are independent of the set of viewers who will churn because CBS is being withheld. Thus, our prior assumption in scenario 3 is that net churn rates should be additive.

[7] The "Top 4" Networks are ABC, CBS, FOX, and NBC.

12. Net Churn rates soared during the channel loss period. Figures 1, 2, and 3 shows net churn rates for the DMAs in scenarios 1, 2, and 3 respectively.[8]

{FIGURE 1}
{SEATTLE-TACOMA, YAKIMA ET AL, AND PORTLAND}
{NET CHURN RATES}

{Figure 1 redacted in its entirety}

[8] These charts were constructed using data provided by DISH.

{FIGURE 2}
{BAKERSFIELD, CA}
{NET CHURN RATES}

{Figure 2 redacted in its entirety}

{FIGURE 3}
{IDAHO FALLS ET AL, EUGENE, AND BOISE}
{NET CHURN RATES}

{Figure 3 redacted in its entirety}

III. A THEORETICAL MODEL OF CHURN

A. *Economic Model*

13. We expand upon the model used by Rogerson and Murphy,[9] and Katz and Israel,[10] of bargaining over a carriage price between a Multichannel Video Programming Distributor ("MVPD") and a channel owner, by allowing the owner to control multiple channels. We investigate whether a merger creates an increase in bargaining power that will raise the prices for carriage beyond the sum of the standalone carriage prices of each channel. The key issue is the impact of the merger on the cost of negotiation breakdown (the "disagreement point") to both parties.

14. A consumer chooses between purchasing monthly subscription services from two MVPD service providers: a cable service provider ("Cable") and a satellite service provider ("DBS"). Each service offers a package of channels X, Y, and Z. For channels X, Y, and Z, consumer i has valuations x_i, y_i, and z_i, respectively. Consumer i also has an idiosyncratic random utility component δ_i which determines whether she prefers Cable or DBS. If $\delta_i > 0$ then she prefers Cable and if $\delta_i < 0$ then she prefers DBS. Each of the variables x_i, y_i, z_i, and δ_i are monthly utility flows. Let p_s be the monthly price of DBS and let p_c be the monthly price of Cable. Then, in any month, consumer i will purchase DBS if the monthly utility flow from purchasing DBS is greater than the monthly flow from purchasing Cable, i.e., if $x_i + y_i + z_i - p_s > x_i + y_i + z_i - p_c + \delta_i$, or $p_c - p_s > \delta_i$. For each consumer, x, y, z, and δ are distributed according to the joint cumulative probability distribution $F(x,y,z,\delta)$, with density $f(x,y,z,\delta)$. Suppose that a

[9] William P. Rogerson, "Economic Analysis of the Competitive Harms of the Proposed Comcast-NBCU Transaction," June 21, 2010. Kevin M. Murphy, "Economic Analysis of the Impact of the Proposed Comcast/NBCU Transaction on the Cost to MVPDs of Obtaining Access to NBCU Programming," June 21, 2010.

[10] Mark Israel and Michael L. Katz, "Economic Analysis of the Proposed Comcast- NBCU-GE Transaction," July 20, 2010.

DBS now faces a situation where channel X is withheld with the expectation that bargaining will take one month before channel X is restored. If consumer i faces a transaction cost of T, which includes cancellation charges, installation charges, and the time-cost of scheduling installation, then she will now switch to the cable provider and sign a k-month contract if the value of switching is greater: $y_i + z_i - k\,p_s < x_i + y_i + z_i - k\,p_c + k\,\delta_i - T$, i.e., if $x_i > k\,(p_c - p_s - \delta_i) + T$. Similarly, if channel y is withheld in a carriage dispute, then the consumer will switch if $y_i > k\,(p_c - p_s - \delta_i) + T$. If both channels are withheld simultaneously in a carriage dispute, then the consumer will switch if $x_i + y_i > k\,(p_c - p_s - \delta_i) + T$.

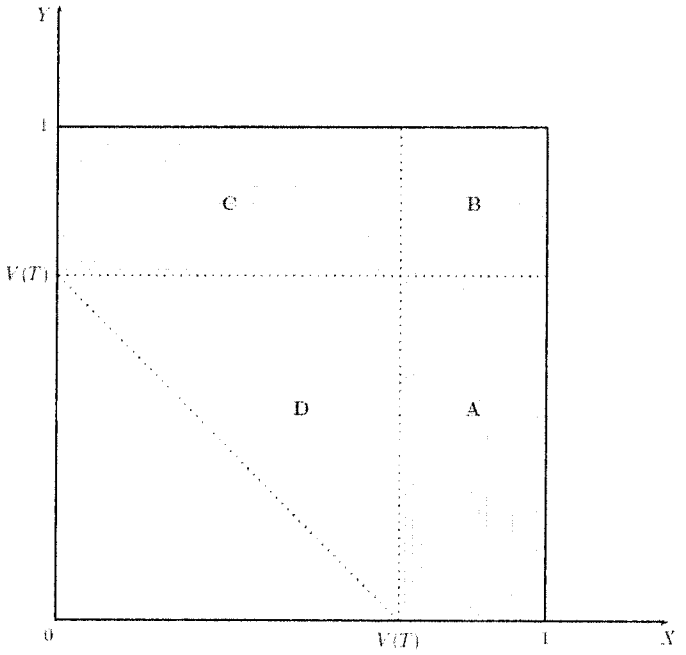
15. Figure 4 offers a graphic description of the implications of the model for the super-additivity of net churn rates. Consumers' monthly valuations x and y are independently and identically distributed according to a uniform distribution on the support [0, 1]. Since, the valuations are distributed identically, the critical valuation for each channel, as a function of the transaction cost T, above which a consumer will switch will be the same for both channels X and Y; this critical value is denoted $V(T)$. The measure of customers who switch if only channel X is withheld is the area $A+B$; the measure of customers who switch if only channel Y is withheld is the area $C+B$; the measure of customers that switch if both are withheld is $A+B+C+D$. Of course, in this last case (where both channels are withheld), the subscribers in area B should not be counted twice. Thus, the question whether a greater number of customers switch if both channels are simultaneously withheld depends on whether D is greater than B. In the case of independent and identical uniform distributions, $D > B$ when the critical mass from withholding a single channel is { }.[11] As net churn rates in practice are between 0

[11] {

}

and 10, this suggests that we are in the region where harm is likely. Notably, the lower the net churn rate from withholding a single channel, the greater the likelihood of increased harms from the joint withholding of multiple channels.

FIGURE 4
GRAPHICAL ANALYSIS OF SUPER-ADDITIVITY CRITERION



IV. AN EMPIRICAL ANALYSIS OF DISH'S CHURN RATES

A. *Data and Methodology*

16. In order to estimate the effect of channel withholding on net churn rates, monthly data were obtained from DISH on (1) the number of subscribers and (2) net churn for 14 Nielsen Designated Market Areas ("DMAs") from June 2008 through March 2010. Statistical summary data (for the channel loss period) were obtained on socio-economic and demographic characteristics of households living in the DMAs. In addition, data on DISH Penetration in each of the DMAs were obtained for the months December 2008, March 2009, June 2009, and December 2009.

17. Of the 14 DMAs in the dataset, 7 DMAs had stations withheld by Fisher. Of the 7 DMAs, 3 DMAs – Eugene (OR), Boise (ID), and Idaho Falls (ID) - had only one station withheld. We regard them as having undergone "Treatment 1" (one channel withheld) during the treatment period. Of the remaining four DMAs, three DMAs had two stations withheld, one of which was a Spanish-language station, and we regard them as having undergone "Treatment 2S" during the treatment period. The DMAs undergoing one of treatments 1, 2 and 2S will be called the "treated" DMAs. Each of the remaining 7 DMAs is the top "look-alike" DMA for each of the treated DMAs (as determined by Fisher, based on socio-economic and demographic similarity). We perform an OLS regression after pooling data for the 14 DMAs.

18. "Dish Penetration" is defined as the number of DISH subscribers divided by the number of Households subscribing to Pay Television. We average the value of Dish Penetration across the four months for which we have data, and use this value as a proxy for market share for each month for the entire sample time period.

19. We use the following structural model to estimate the treatment effect of withholding stations on net churn rates:

$$\textit{Net Churn Rate}_{it} = \alpha + \gamma_{it}^{1}\, \textit{Treatment1}_{it} + \gamma_{it}^{2}\, \textit{Treatment2}_{it} + \gamma_{it}^{2S}\, \textit{Treatment2S}_{it} + \beta_i X_i + \gamma_i\, \textit{Market Share}_i + \sum_j \delta_t^j\, \textit{Month}_t^j + \epsilon_{it}$$

20. DMAs are indexed by i and months by t. Dummy variable $\textit{Treatment1}_{it}$ is equal to 1 if DMA i received Treatment 1 during month t. Dummy variables $\textit{Treatment2}_{it}$ and $\textit{Treatment2S}_{it}$ are defined analogously. The vector X_i consists of (1) dummies for major ethnicities (White, African American, and Hispanic), (2) Average Householder Age, (3) Average

Household Income Bracket, and (4) Average Estimated Credit Score. The dummy variable $Month_t^j$ is equal to one when the index j (which indexes all the months in the sample) equals t.[12]

B. *Regression Results*

21. The results of the OLS regressions are presented in Table 2 with t-statistics reported below the estimated coefficients. Note that in each model, the estimated value of γ_{it}^2 is greater than twice the estimated value of γ_{it}^1, and that the estimated value of γ_{it}^{2S} is approximately equal to γ_{it}^1.

{TABLE 2}
{REGRESSION RESULTS}

{Table 2 redacted in its entirety}

[12] We also use an alternative model, where DMA fixed effects replace demographic variables. The results for both gross and net churn rates are roughly similar in this case – the coefficient of Treatment 2 is approximately, though slightly less than, twice the coefficient of Treatment 1, and the coefficient of Treatment 2S is approximately equal to the coefficient of Treatment 1. Thus, our results are robust to the natural alternative specification of the model using fixed DMA effects.

{Table 2 redacted in its entirety}

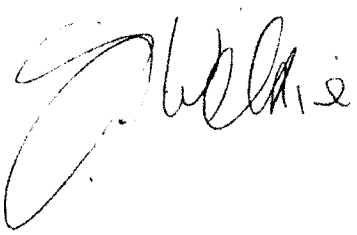
C. *Hypothesis Tests: Super-Additivity of Churn if Channels are Substitutes*

22. We derive an equivalent formulation of the model to test the one-sided null hypothesis that $\gamma_{it}^{2} \geq 2\ \gamma_{it}^{1}$. The derivation and hypothesis test are presented in Appendix II. We cannot reject the null hypothesis at the 5% level and we conclude the net churn rates are super-additive. We also test the null hypothesis that $\gamma_{it}^{2} \geq 2\ \gamma_{it}^{1}$ and cannot reject it at the 5% level. We conclude that net churn rates are additive when channels are not substitutes.

V. CONCLUSIONS

23. The super-additivity of churn rates affects the bargaining power that content providers possess when they negotiate the terms under which their content may be carried by an MVPD. While our study covers the foreclosure of broadcast stations, it supports the inference that a concentration of channels resulting from a horizontal merger between two content providers, including a concentration of marquee cable networks with core fan bases that do not appear to overlap in a significant degree, results in a disproportionate increase in the bargaining power of the merged entity, because MVPDs stand to lose a disproportionate number of subscribers if partly substitute channels are withheld simultaneously.

I declare under penalty of perjury that the foregoing is true and correct. Executed on January 14, 2011.



Simon J. Wilkie

APPENDIX I: GROSS CHURN RATES

Gross churn rates for the 7 DMAs are shown in the Figures 5, 6, and 7.

{FIGURE 5}
{SEATTLE-TACOMA, YAKIMA ET AL., AND PORTLAND}
{GROSS CHURN RATES}

{Figure 5 redacted in its entirety}

{FIGURE 6}
{BAKERSFIELD, CA}
{GROSS CHURN RATES}

{Figure 6 redacted in its entirety}

{FIGURE 7}
{IDAHO FALLS ET AL., EUGENE, AND BOISE}
{GROSS CHURN RATES}

{Figure 7 redacted in its entirety}

We use the following structural model to estimate the treatment effect of withholding stations on gross churn rates:

$$Gross\ Churn\ Rate_{it} = \alpha + \gamma_{it}^{1}\ Treatment1_{it} + \gamma_{it}^{2}\ Treatment2_{it} + \gamma_{it}^{2S}\ Treatment2S_{it}$$

$$\beta_i X_t + \gamma_i\ Market\ Share_i + \sum_j \delta_t^j\ Month_t^j + \epsilon_{it}$$

The formulation, except for the regressand, is exactly the same. The results of the OLS regression are presented in Table 3 with t-statistics reported below the estimated coefficients.

{TABLE 3}
{REGRESSION RESULTS}

{Table 3 redacted in its entirety}

{Table 3 redacted in its entirety}

Note that we get results similar to those of net churn rates. The coefficient of Treatment 2 is more than twice that of Treatment 1 and the coefficient of Treatment 2S is approximately the same. Hypothesis testing yields the same results. The test of the null hypothesis that $\gamma_{it}^{2} \geq 2\ \gamma_{it}^{1}$ is presented in Appendix III. We cannot reject the null hypothesis at the 5% level and we conclude the gross churn rates are super-additive. We also test the null hypothesis that $\gamma_{it}^{2} = 2\ \gamma_{it}^{1}$ and cannot reject it at the 5% level. We conclude the gross churn rates are additive when channels are not substitutes.

REDACTED – FOR PUBLIC INSPECTION

APPENDIX II: TESTING THE SUPER-ADDITIVITY HYPOTHESIS

The regression model is specified as

$$Net\ Churn\ Rate_{it} = \alpha + \gamma_{it}^{1}\ Treatment1_{it} + \gamma_{it}^{2}\ Treatment2_{it} + \gamma_{it}^{2S}\ Treatment2S_{it} +$$

$$\beta_i X_i + \gamma_i\ Market\ Share_i + \sum_j \delta_t^j\ Month_t^j + \epsilon_{it}$$

Let $\tau = \gamma_{it}^{2} - 2\ \gamma_{it}^{1}$. Testing the null hypothesis H_0: $\gamma_{it}^{2} \geq 2\ \gamma_{it}^{1}$ against the alternative H_0: $\gamma_{it}^{2} < 2\ \gamma_{it}^{1}$ is equivalent to testing the null hypothesis H_0: $\tau \geq 0$ against the alternative H_a: $\tau < 0$. We rewrite the regression as follows

$$Net\ Churn\ Rate_{it} = \alpha + \gamma_{it}^{1}\ (Treatment1_{it} + 2\ Treatment2_{it}) + \tau_{it}\ Treatment2_{it} +$$

$$\gamma_{it}^{2S}\ Treatment2S_{it} + \beta_i X_i + \gamma_i\ Market\ Share_i + \sum_j \delta_t^j\ Month_t^j + \epsilon_{it}$$

We estimate τ_{it} from the OLS regression, and test the null hypothesis H_0: $\tau \geq 0$ against the alternative H_a: $\tau < 0$. We reject the null hypothesis at the 5% level if the t-value of the estimate of τ_{it} is { }. Regression output is shown in Table 4 for both gross and net churn rates, with t-statistics reported below estimated coefficients. For net churn rates, we see that the t-statistic for τ_{it} is { }. Hence, we do not reject, at the 5% level, the null hypothesis that the difference between γ_{it}^{2} and 2 γ_{it}^{1} is positive. We make a similar conclusion for gross churn rates, { }.

{Table 4}
{Regression Results}

{Table 4 redacted in its entirety}

{Table 4 redacted in its entirety}

{Table 4 redacted in its entirety}