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Subject: Peer Review of November 2010 FCC Working Paper titled "Broadband Decisions: What drives consumers to switch – or stick with – their broadband Internet provider."

Dear Dr. Ralph,

In response to your request, I have reviewed the FCC Working Paper, "Broadband Decisions: What drives consumers to switch – or stick with – their broadband Internet provider." The paper summarizes the results of a FCC survey conducted in April and May 2010, designed to focus on consumers' choices related to home broadband Internet adoption. The survey and resultant analysis directly follow the desire put forward in the National Broadband Plan to understand why some consumers choose not to adopt broadband at home.

The paper focuses on consumers' satisfaction with the Internet provider they have, and the perceived costs and benefits of providers they may have an opportunity to use. Following, I provide comments on the survey methodology, the survey itself, and finally the resultant working paper. The first two topics are useful to address in order to further an adequate understanding my general comments on the paper.

Survey Methodology

The survey methodology as reported seems sound. The survey was conducted by calling both landline and cellular phones, and surveyors obtained an appropriate sample size to draw significant conclusions from the resultant data. The sample is balanced to match usage as well as national demographic data. An appropriate weighting procedure was used; however, the methodology might have shed light on some of the survey results had it been more clear about the robustness of the weights used. For example, in general the weighted sample distribution developed resulted in apparently reasonable corrections. However, some demographic variables have seemingly significant changes from the unweighted: the unweighted sample of college graduates is 36.6%; the weighted is 27.8%. Similarly, cell phone only respondents were 12.4% unweighted, and 22.2% weighted to coincide with the parameter of 23.6%. Some explanation as to the possible ramifications of such weights might serve to support the validity of the methodology. The survey does indicate that surveys generally suffer from possible errors of selection bias and reporting inaccuracies of respondents. In general, I find that the survey methodology as reported is consistent with standard survey practices used in analyses of similar types of questions of landline and cellular phone users.

Wired and Wireless Internet Survey FINAL Questionnaire, 3/19/2010

The survey itself is thorough. Contacting landline respondents and cellular respondents, the survey asks questions regarding home computer use and Internet access, speeds, providers, and satisfaction (generally). It also includes questions regarding the monthly bill, installation fees, and actual and perceived switching costs. Missing (and potentially useful in answering the primary questions of the paper) are questions regarding the usage in terms of time as well as function: understanding what people do once online is important to understanding what drives consumers to switch (or remain with) a provider. My comments on the working paper should be viewed in light of the fact that potentially valuable questions were not included in the survey and therefore data is not available for analysis.

November 2010 Working Paper

The paper puts forward an appropriate introduction that emphasizes the importance of this topic of inquiry. The first section in which the author provides an overview of home Internet adoption in the US considers other recent surveys that also captured broadband use at home. Some statistics in terms of percentages are provided both here and in a section reporting the frequency of switching home Internet service. An emphasis is on an analysis of those questions in the survey that relate to consumers' consideration of switching providers. Information is presented in terms of percentages of respondents choosing varying degrees of perception of how easy it might be to switch providers. Based on the information provided, I find nothing statistically incorrect or economically misstated in the paper. I do believe, however, that there are a number of considerations that should be included in the paper that currently are not. Following I outline these points.

* Surveys and the treatment of outliers

It is important to note at the outset of the paper that some of the data represents subjective opinions and impressions of the respondents, including statements about what they intend to do or have considered doing. Survey respondents' answers to such questions can be imprecise. Cummings *et al*. (1995) found that when survey respondents are asked whether a product is worth a particular price, more respondents will say "yes" if they are told they have no obligation to buy the product at the stated price than if there is an obligation to purchase at that price. Respondents' statements concerning their satisfaction and intent to switch providers might be imprecise. If the errors in respondents' answers are random, then the effect on any statistical research is to decrease the confidence that can be placed in statistical results. If the errors are systematic, in other words, if respondents consistently overstate a desire to switch providers, then the effect on any statistical analysis is to bias results. Since it is not possible to know whether respondents made errors in their answers and, if they did, the direction of those errors, one should report results with this caveat.

Similarly in terms of the validity of data used, it is important to understand outliers and state how such outliers are handled. The source of outliers could be an error by the surveyor in recording a legitimate response; an error by the respondent due to a misunderstanding of the question; and/or an error by the respondent due to intent to exaggerate or refusal to report an accurate response. It is not possible to determine in all cases whether an outlier falls into one or more of the categories or whether a response was in fact a truthful response, and hence, a true outlier. Further, it is not possible to determine in all cases whether a non-outlier response could be an incorrect response. It is important to know how the researcher handled any manual corrections of 'incorrect' responses. As such, summary statistics

identifying the means, medians, standard deviations and extreme percentiles would be helpful in understanding the statistical information provided.

* Substitutability of methods of connection

While many Internet adoption studies are limited with respect to determining demand elasticities, the April – May 2010 survey appears to have obtained price data as well as speed data; this might allow consideration of demand elasticities which might be comparable across landline, cellular, and smart phone users (for example). A number of studies do provide estimates of demand elasticities, although each has difficulties. For example, in two complementary studies of the price elasticity of demand for broadband in the United States, Rappoport *et al*. (2001) found that demand for broadband via cable modems was price inelastic, but that demand for DSL was price elastic. The study also found that DSL and cable modems were substitutes; the authors then attributed the differences in own-price elasticities to differences in penetration. Crandall, Sidak, and Singer (2002) updated the Rappoport *et al*. study and found that the elasticities had not changed substantially, but in their own follow-up study, Rappoport *et al.* found that demand for the services was becoming more price inelastic, perhaps indicating either increasing penetration or that the services were becoming more essential. At about this same time, Varian (2002) examined consumers' willingness to pay for additional bandwidth for an Internet access service offered by the University of California at Berkeley and found that demand was price inelastic. While Varian's study cannot be compared directly with the Rappoport *et al*. studies because Varian considered only users of the Berkeley service, Varian's findings at least are consistent with the latter Rappoport *et al*. study. While determining demand elasticities clearly is beyond the scope of the working paper, it might warrant mention given that the paper focuses on switching, where substitutes consumers may have in their homes would serve to impact their consumption choices.

* Bundles

A consumer with Internet bundled with other services has a lower predisposition to switch providers, and may be tied to fixed rather than mobile broadband due to the nature of bundled options offered (see Hauge *et al*. 2009); therefore, bundles represent an important factor to include in any formal analysis. It is possible that reports of switching being extremely difficult are due to bundles. This is not clear from the results presented in the paper; however, summary statistics of relevant data might shed light on this possibility.

* Consideration of more advanced statistical methods to support the paper's goal

Analysis of adhesion is important. A tendency for customers to change providers implies that customers perceive that the possible benefits of changing providers are greater than the cost and risk of changing providers. The survey captures this information by asking respondents about the perceived costs to them for switching. The possible benefit of changing is the difference between what the customer experiences as his or her net consumer surplus with the current provider and the expected net consumer surplus with a new provider, where net consumer surplus is the difference between value that the customer believes the operator provides and the price the customer pays. If the benefit provided by the current provider is close to what the customer thinks might be provided by alternative operators, then customers are less likely to change providers. This might happen, for example, if customers perceive that operators provide nearly homogeneous services and similar prices. A customer might perceive significant differences in provider benefits if the customer has recently had a negative experience with a provider such as a significant service outage or impolite customer service

representative; service quality has declined and the consumer believes that the decline is unique to the current provider; fresh advertising by alternative providers extol value that the customer does not receive from the current provider; or acquaintances have strong recommendations for alternative providers. The survey captures this by asking about speed and satisfaction with service, among other questions. Worth noting is that a perception of nearly equal benefits does not mean that quality and satisfaction are high; the perception simply means that the current experience is thought to be equivalent to the alternatives.

Consumers also consider the costs of change and the risks when assessing whether a switch in service providers might be beneficial. There are at least two types of costs referenced in the paper: service termination fees, costs of establishing new payment systems, and any new equipment that might be required, for example, in the case of switching from DSL to cable modem; and search costs, namely the cost a customer would incur to learn about service alternatives. Both of these factors can be included in an analysis as questions about them were included in the survey. (Termination fees and related costs are included directly; search costs can be included because respondents were asked the names of companies of which they were aware.)

In analyzing consumers' propensity to switch providers, it seems important to first consider factors that influence a customer's decision to subscribe to home Internet access, and then address the decision to subsequently consider switching methods of access, and/or switching providers. Among those preferences for broadband access is the degree to which the respondent is satisfied with using Internet access elsewhere, for example at work, school, or a library. Many respondents asked in other surveys reported they simply had no reason to switch (Hauge *et al*. 2009). Others may be satisfied with their home Internet access because they have alternate access elsewhere (primarily work and school) and presumably therefore do not have as great a need for broadband at home. Such information would be useful to include (the survey does touch on such issues).

The paper lists percentages of respondents who report they would consider switching providers, and how easy each believed it would be to switch. This is tangentially related to the intensity of the desire to switch, which may be relevant. The intensity to switch can be viewed as a binary choice of likely to switch and unlikely to switch, or as ordinal in which a consumer might indicate greater satisfaction with the current provider and therefore a lower desire to switch. Each of these factors can be considered in more detail using the data collected.

Modeling the decision to switch providers could be carried out using consumer characteristics and a logit regression model representing the choice between mutually exclusive options. One could consider the intention to switch providers, and then could utilize an ordered logit model to focus on the intensity with which a respondent intends to switch providers or the easy with which a respondent believes he could switch. Because we do not have complete summary statistics, it is not clear whether there are enough respondents in each category to allow such an empirical analysis; however, it is worth consideration.

Additionally, it might be possible to econometrically link the intention to switch with reported speed (again depending on the nature of the data collected in the survey, which asks respondents about their connection speed). Hauge *et al*. (2009) found an average customer who is very satisfied with speed is about 50 percent less likely to want to switch providers than is a customer who is merely satisfied with speed. Having filed a complaint also makes one more likely to switch. Finally, bill clarity was found to affect the intensity of the desire to switch, but not the basic intent. Because the April – May 2010 survey

asks respondents about similar issues, formal econometric analysis might be pursued to provide a more robust result.

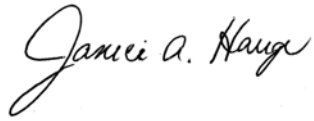
* Consideration of usage objectives and patterns.

The title of the paper, "Broadband Decisions: What drives consumers to switch – or stick with – their broadband Internet provider" implies a more inclusive analysis of options. To examine this question more fully, it is appropriate to consider usage patterns (in terms of time) and online activities (for example do respondents use home Internet primarily for social functions such as e-mail, for entertainment functions, or for business functions such as banking). The ways in which respondents use home Internet seem critical to their willingness to switch or not switch providers. This information was not asked about in the survey and therefore cannot be included in the paper. It might be worth mentioning in the paper, however, that these activities are expected to influence consumption choices.

In summary, the importance of the question is clear, and the clarity with which the presented results are given is excellent. I found no incorrect economic analysis in the paper. My primary criticism is that it is possible to err in believing the study encompasses sufficient information to fully justify the title of the paper. Without more robust econometric analysis using the available survey data, the impact of the findings (even in percentage terms) is unclear. Additional data captured by the survey might be used to shed more light on the general findings presented. Perhaps such econometric analysis is beyond the scope of this paper, or the limitations of the survey questions provide a significant barrier to more detailed analysis. Regardless, mention of the above details is warranted to ensure the paper and its findings do not misrepresent the state of home Internet access in the U.S. and consumers' choices and reported perceptions of such access.

I appreciate the opportunity to review this paper, and am happy to clarify any comments made above.

Respectfully submitted,



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