Properly Estimating the Size of the Wireless-Only Market

The Federal Communications Commission ("FCC") has recently discussed estimates of "wireless-only" subscribers[1] when calculating the residential market share of incumbent local exchange carriers ("ILECs") as part of its Section 10 forbearance analysis.[2] The potential inclusion of a wireless-only estimate in the FCC's market share calculation places increased importance on a critical examination as to *what* data measuring wireless-only penetration is most reliable and *how* that data should be interpreted.

This report recommends that any estimate of wireless-only subscribers used in a forbearance analysis satisfy four requirements:[3]

* The estimate should be developed from the best-available data collected by a neutral party. Data from the semi-annual National Health Interview Survey released by the Centers for Disease Control best satisfies this criterion ("CDC Survey") at this time.

* The estimate should reflect regional differences in wireless acceptance.[4]

* Given the critical importance of the forbearance analysis, the FCC should not rely on the CDC Survey's point-estimate of wireless-only households, but should instead use the lower bound of the 95% confidence interval. By relying on the lower bound of this interval estimate, the FCC will better protect against the risk that it

---

[1] The FCC refers to these customers as "cut-the-cord" wireless subscribers.

[2] *See* Petition of the Verizon Telephone Companies for Forbearance Pursuant to 47 U.S.C. § 160(c) in the Boston, New York, Philadelphia, Pittsburgh, Providence, and Virginia Beach Metropolitan Statistical Areas, WC Docket No. 06-172, Memorandum Opinion and Order (rel. Dec. 5, 2007) ("*Verizon Six-MSA Order*").

[3] By recommending these criteria, this report does not endorse the FCC including wireless service in its forbearance analysis. Including *wireless* lines in a *wireline* forbearance analysis assumes a degree of substitutability between such services at odds with the facts and the FCC's own conclusions in other contexts. Consequently, the recommendations of this report focus on criteria that should be applied to the development of a wireless-only estimate *assuming* (without endorsement) that the FCC's analytical framework might include wireless-only lines.

[4] The CDC Survey separately reports estimates of wireless-only households for each of the four geographic regions used by the Census Bureau: Northeast, Midwest, South, and West.

is adopting an inflated estimate of the actual number of wireless-only subscribers.

* The estimate should exclude identifiable groups that, because of factors unique to each of those groups, can be expected to exhibit wireless preferences that are not representative of the population as a whole. Specifically, college-age respondents should be excluded from the calculation.

A further discussion of these four criteria – as well as a wireless-only share based on the most recent CDC Survey that complies with these criteria – is provided below.

<u>The Use of Wireless-Only Estimates in Forbearance Analysis</u>

The FCC first included discussion concerning the potential inclusion of wireless-only lines in the calculation of an incumbent's market share in the *Verizon Six-MSA Order*.[5] Although the FCC incorporated an estimate of wireless-only customers in determining Verizon's residential market share, the Commission has otherwise expressed skepticism that wireless services are true substitutes for wireline local exchange service. Most recently, the FCC expressly abandoned its earlier prediction that wireless services would become substitutes to wireline service, explaining:

> [We] did not foresee that competitive ETCs might offer supported services that were not viewed by consumers as substitutes for the incumbent LEC's supported services…. Thus, rather than providing a complete substitute for traditional wireline service, these wireless competitive ETCs largely provide mobile wireless telephony service in addition to a customer's existing wireline service.
>
> ***
>
> Because the majority of households do not view wireline and wireless services to be direct substitutes, many households subscribe to both services …[6]

The FCC's skeptism that wireless service will *replace* wireline service – as contrasted with being purchased in *addition* to wireline service – is well founded.

---

[5] Although the FCC has used estimates of "cut-the-cord wireless substitution" in other contexts (*see Verizon Six-MSA Order*, at ¶ 27, n. 89), the *Verizon Six-MSA* analysis was the first time that the Commission discussed possibly using such information when judging whether forbearance was appropriate.

[6] *Federal-State Joint Board on Universal Service*, Notice of Proposed Rulemaking, WC Docket Nos. 05-337 and 96-45, (rel. Jan. 29, 2008) ("*Identical Support NPRM*"), at ¶¶ 9-10. *See also id.*, at ¶ 12 ("… the majority of competitive ETCs [which are wireless] generally do not sell services that consumers view as direct substitutes for wireline services.").

According to CTIA,[7] the number of wireless subscribers (243 million) is rapidly approaching the total population of the United States above the age of 9 (estimated at 256 million).[8] If wireless service was replacing wireline service in the manner that the FCC once predicted, wireline service would already have virtually disappeared.

Nevertheless, there is evidence that some consumers rely exclusively on wireless service and, to the extent that the FCC evaluates forebearance requests applying market share calculations that incorporate an estimate of wireless-only lines, it is important that number of wireless-only lines be estimated correctly.

The Minimum Criteria Applicable to a Wireless-Only Estimate

In the *Verizon Six-MSA Order*, the FCC estimated the cut-the-cord wireless population applying the nationwide point-estimate of the percentage of wireless-only households developed by the CDC.[9] As an initial approximation of the number of wireless-only households, the FCC's reliance on the nationwide point estimate provided by the CDC Survey may not have been unreasonable, particularly within an order rejecting forebearance because of Verizon's failure to meet a number of thresholds.

Before approving any petition where an estimate of wireless-only subscribers is included in the analysis, a far more critical examination as to how a wireless-only estimate should be developed is needed. A minmum of four criteria are proposed below that any wireless-only estimate should satisfy before it should be considered for inclusion in a market share calculation.[10]

(1) *The estimate should be developed from the best available data collected by a neutral third party.* The semi-annual National Health Interview Survey released by the Centers for Disease Control – which provided the source data relied upon in the *Verizon Six-MSA Order* – is the best currently available information,

---

[7] Semi-Annual Wireless Industry Survey Results, CTIA-The Wireless Association, Estimate as of June 2007.

[8] Estimated U.S. Population as of July 2007, U.S. Census Bureau, Dec. 27, 2007, adjusted by Age Distribution from 2000 Census (Source: CensusScope.Org).

[9] *Verizon Six-MSA Order*, Appendix B, citing Centers for Disease Control and Prevention, *Wireless Substitution: Early Release of Estimates Based on Data from the National Health Interview Survey, July-Dec. 2006* (rel. May 14, 2007) ("*CDC May 2007 Survey*").

[10] As indicated earlier, this report assumes that the FCC retains the basic framework to judge the appropriateness of a forbearance request described in Appendix B to the *Verizon Six-MSA Order*. This assumption, however, should not be interpreted as an endorsement of that framework. There are substantial problems with the methodology described in Appendix B, including that the methodology: (1) focuses exclusively on retail market conditions; (2) does not separately evaluate the residential and business product markets; and (3) would sanction the emergence of an unduly concentrated market by eliminating competition based on unbundled network elements ("UNEs"), largely in response to the success of a single cable-based provider of communications services.

routinely developed, using valid survey techniques by a neutral party.[11] Although the most appropriate data *source* was used in *Verizon Six-MSA Order*, the specific metric adopted by that order – the nationwide point estimate – is not appropriate.

(2) *Where data permits, the estimate should capture regional differences in wireless acceptance*. Importantly, the CDC Survey provides detail on wireless-only penetration at the regional level. Specifically, the CDC Survey provides separate estimates – and, as discussed in more detail below, confidence intervals – for each of the four geographic regions routinely used by the Census Bureau: Northeast, Midwest, South, and West.

As the table at right demonstrates, there are substantial differences in the estimates of wireless-only households between regions. This is true whether the metric

Table 1: Comparing the Regional Wireless-Only Estimates to the National Average[12]

Region	Point Estimate	Confidence Interval
Northeast	8.8	7.10 -10.81
Midwest	14.0	12.35 -15.83
South	14.9	13.42 -16.40
West	10.9	9.54 -12.33
Nationwide	12.6	11.84-13.48

[11] Indeed, the reason that the CDC collects information on wireless-only households is unrelated to the contentious economic and regulatory issues to which its data is often applied. Rather, the CDC's National Center for Health Statistics (NCHS) monitors a variety of health-related attributes of the population. As explained by the CDC:

> Most major survey organizations, including the NCHS, do not include wireless telephone numbers when conducting random-digit-dial telephone surveys. Therefore, the inability to reach households with only wireless telephones (or with no telephone service) has potential implications for results from health surveys, political polls, and other research conducted using random-digit-dial telephone surveys. Coverage bias may exist if there are differences between persons with and without landline telephones for the substantive variables of interest.

Centers for Disease Control and Prevention, *Wireless Substitution: Early Release of Estimates Based on Data from the National Health Interview Survey, Dec.-July 2007* (rel. Dec. 10, 2007) ("*CDC December 2007 Survey*").

[12] The CDC Survey publishes *regional* wireless-only penetration as a percentage of adults. The CDC separately provides a slightly higher *nationwide* estimate of wireless-only penetration calculated as a percentage of households (13.6% for the period shown in Table 1). To maintain consistency with the published results of the CDC Survey, this report analyzes wireless-only penetration as a percentage of responding adults.

is a point estimate or confidence interval. As such, the FCC should use the applicable regional estimate in its analysis, rather than the nationwide average.

(3) *The FCC should base its analysis on the lower bound of the 95% confidence interval and not the point estimate for each region.* The CDC Survey, like all surveys, employs a sample to estimate a population average. Because all sample means are likely to deviate from the actual population mean to some extent, confidence intervals are frequently used to encompass the *range* of values within which the actual mean is likely to reside.[13]

The importance of the confidence interval – in comparison to the point estimate – is illustrated by comparing the CDC Survey results from June-December 2006 to the more recent January-June 2007 Survey. Focusing exclusively on the point estimate could lead one to conclude that the percentage of wireless-only households continues to grow throughout the nation, with the point estimates increasing for each region.

Table 2: Comparison of CDC Surveys

Census Region	CDC Survey June-Dec. 2006			CDC Survey Jan.-June 2007		
	Point Est.	*95% Conf. Interval*		Point Est.	*95% Conf. Interval*	
		Lower	Upper		Lower	Upper
Northeast	8.6	6.5	11.2	8.8	7.1	10.8
Midwest	11.4	9.9	13.1	14.0	12.4	15.8
South	14.0	12.2	16.0	14.9	13.4	16.4
West	11.0	9.3	13.0	10.9	9.5	12.3

Expanding the comparison to include an analysis of the confidence intervals from each survey, however, supports a different conclusion. In three of the four regions (that is, all regions except the Midwest), the point estimate from the more recent survey (Jan.-June 2007) falls *within* the confidence interval of the prior survey, suggesting that the more recent estimate may simply be a different estimate for the same underlying population. Moreover, for two of the regions, the entire confidence interval for the Jan-June 2007 survey falls within the confidence interval of the prior (June-December 2007) survey, suggesting that the later survey may enjoy greater *precision* in its estimate, but not necessarily a statistically different *value*.

The point of this discussion is that the Commission could easily misinterpret the CDC Survey if it bases its analysis on the point estimate for the

[13] Generally speaking, a 95% confidence interval means that if an average were calculated on multiple samples, the calculated confidence interval (which would differ for each sample) would encompass the true population parameter 95% of the time. For the purpose used here, it is reasonable to compare the 95% confidence interval to the "margin of error" commonly used in polling. In lay terms, a 95% confidence interval means that there is a 95% liklihood that the actual average is within the upper and lower bounds of the interval.

number of wireless-only households.[14] Given the potential importance of the wireless-only estimate – *i.e.*, the estimate could possibly lead the Commission to conclude that the elimination of an incumbent's unbundling obligations is warranted – it is critical that the Commission have confidence in the value chosen.

Rather than use the point estimate from the CDC Survey, it is recommended that the Commission use the lower bound of the 95% confidence interval. The lower bound is appropriate because the harmful consequences of overestimating wireless-only penetration (and thereby prematurely granting forbearance) are greater than the potential harm in taking a more conservative approach.[15] By relying on the lower bound of the interval estimate, the Commission can be highly confident that the actual level of wireless-only lines is at or above the value used in its analysis, while limiting any risk that it might reach differing conclusions regarding wireless-only penetration merely because two point estimates from different samples both fall within the same confidence interval.

(4) *The FCC should exclude identifiable groups that are not representative of the population as a whole*. The CDC Survey unambiguously documents the fact that the highest concentration of wireless-only penetration is among the young. As the table at right shows, wireless-only behavior is most prevalent among college-age adults, where "roommates" are the most prevalent form of "household."[16]

Table 3: Age Distribution of Wireless-Only Heads of Household

Age	Est. %
18-24	27.9
25-29	30.6
30-44	12.6
45-64	7.1
> 65	2.0

The college experience – with its unique purchasing patterns and behavioral choices – is not representative of the adult population as a whole. The CDC Survey reveals the disproportional influence of the college-age population on the overall profile of the wireless-only consumer, concluding that wireless-only households are more likely (than wireline households) to have engaged in binge drinking in the past year, to include smokers, and to have experienced serious psychological distress in the prior month.

---

[14] In addition, the CDC warns that estimates based on less than a full year's data exhibit large variances due to the relatively small sample sizes, and recommends caution in how such estimates are interpreted. *CDC December 2007 Survey*, at 2. This suggests that the FCC should rely only on estimates developed from a full year of survey data, and should not isolate its analysis on the most recent estimate from a half-year survey.

[15] It is not the purpose of this analysis to debate the relative merits of forbearance but rather to identify the relative consequences of error – that is, the harm potentially caused by granting forbearance based on an *over*-estimate of market conditions, in comparison to the harm caused by denying forbearance because of a false *under*-estimate of those conditions.

[16] The CDC Survey estimates that more than one-half of all adults living with unrelated roommates live in "households" with only wireless phones. *CDC December 2007 Survey*, at 2.

To properly estimate the lasting effects of wireless-only pressures on the incumbent, the Commission should remove from its analysis the distorting influence of college-age wireless-only respondents. The unique qualities of wireless service make it the ideal communications solution for young adults.[17] Matching the behavioral patterns of young adults, however, does not mean that wireless service is a meaningful economic substitute for more mature households, much less a viable offering to meet the communications needs of the nation's business community. To the extent that the FCC relies on estimates of wireless-only lines in its forbearance analysis, the Commission should first remove college-age respondents from the sample.[18]

Corrected Estimates of Wireless-Only Lines

The following table estimates the percentage of wireless-only adults, based on the data collected in the Jan.-June 2007 CDC Survey, but eliminating respondents in the 18-24 age group.[19]

Table 4: Corrected Estimate of Wireless-Only Penetration

Region	With College-Age	Without College-Age	Estimated 95% CI[20]		Corrected Estimate
			Lower	Upper	
Northeast	8.8%	6.8%	5.1%	8.8%	5.1%
Midwest	14.0%	9.6%	7.9%	11.4%	7.9%
South	14.9%	10.9%	9.4%	12.4%	9.4%
West	10.9%	7.4%	6.1%	8.9%	6.1%

As demonstrated by Table 4, the wireless-only household remains relatively rare, particularly when the analysis is limited to the adult households beyond college-age. This conclusion is reinforced by a recent review of confidential information concerning the number of wireline numbers ported to a wireless provider. The more subscribers perceive the services as substitutes, the more one would expect to see customers disconnecting their wireline service and porting their number to a wireless provider. The

[17] Contemporary wireless services not only provide access to users away from their principal residence, the services support mobile text messaging, music-downloads, and customized ring-tones (not to mention video replay and game playing).

[18] It also questionable whether college-age respondents should properly be considered "cut-the-cord" subscribers, as it is not clear whether such respondents would have subscribed to wireline service had they not had access to a wireless phone.

[19] Although not routinely published, the wireless-only averages calculated after the removal of the 18-24 age group respondents were supplied by the CDC.

[20] The 95% Confidence Interval ("CI") is constructed by applying the CI for each region published by the CDC to a revised mean calculated after the removal of the 18-24 age group.

data reveals, however, that *very* few customers (less than 1%) have ported their wireline phone number to a wireless provider.[21]

The Telephia Survey Cited by Qwest is Unreliable

Although there may be disagreement as to how wireless-only data should be interpreted, most observers agree that the CDC Survey provides the most reliable data source available at this time to determine the number of wireless-only lines. For example, Qwest recommends use of the CDC Survey results generally,[22] although it goes on to claim that a survey conducted by Telephia (and cited by the FCC in its most recent CMRS Competition Report) suggests that individual markets in the Qwest region are experiencing levels of wireless-only penetration that are greater than the national average.[23]

To begin, the Telephia survey cited in the *Twelfth CMRS Report* is nothing more than an abbreviated press story that does not provide the level of statistical detail and objectivity of the CDC Survey. For this reason alone, the FCC should ignore the Telephia survey in its forbearance analysis.

More importantly, however, the press release announcing the survey cited by the *Twelfth CMRS Report* contains the following critical disclaimer:

> Note: Wireless substitution rates were determined through an online survey of 700+ households for each metropolitan area. National Health Interview Survey (NHIS) data was used to adjust for off-line households. Differences in wireless penetration rates between cities may not be statistically significant.[24]

---

[21] See Pre-Filed Direct Testimony of Joseph Gillan on Behalf of Cox Virginia Telcom, Inc. (Revised), *Application of Verizon Virginia Inc. and Verizon South Inc. For a Determination that Retail Services Are Competitive and Deregulating and Detariffing of the Same*, Virginia Corporation Commission Case No. PUC-2007-00008, filed June 1, 2007, at 18. The wireline-to-wireless porting data also showed that, of the customers that have ported their wireline number to a wireless carrier, significantly more than half ported their number to Verizon Wireless, the affiliate of the incumbent local exchange carrier in Virginia.

[22] *See, e.g.*, Letter from Melissa Newman, Vice President, Qwest, to Marlene H. Dortch, Secretary, Federal Communications Commission, WC Docket No. 07-97 (filed Mar. 5, 2008), at 7 (recommending that the FCC use the CDC Survey nationwide estimate). As explained above, relying on the nationwide point estimate is likely to overstate the number of wireless-only lines in most states comprising the region served by Qwest.

[23] *Id.*, citing *Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services*, WT Docket No. 07-71, Twelfth Report (rel. Feb. 4, 2008) ("*Twelfth CMRS Report*"), at ¶ 248.

[24] *See* Telephia Press Release, attached to Brigham/Teitzel Declaration – Denver MSA, WC Docket No. 07-97 (filed Apr. 27, 2007), at Exhibit 5, p. 3 (emphasis added).

In other words, the claimed differences in wireless-only penetration rates announced by Telephia may have arisen simply due to random influences and may not accurately reveal true differences between the markets. While such imprecision may be reasonable for other purposes to which the Telephia survey may be put, the FCC should not risk basing a forbearance determination on claimed differences between markets that may be the result of random sampling or other factors.

Further, the claimed levels of wireless-only penetration in the Telephia survey are fundamentally inconsistent with the pattern of wireless penetration by Economic Area detailed by the *Twelfth CMRS Report.* Table A-3 of the *Twelfth CMRS Report* computes estimated wireless penetration rates for most major cities (organized as Economic Areas).[25] Importantly, the levels of wireless-only penetration claimed by Telephia fail to correlate with the levels of wireless penetration contained in the *Twelfth CMRS Report*, regardless of whether wireless penetration is measured as a percentage of the population or is measured in absolute lines.[26] The Telephia survey is not reliable as a geographic estimate of the number of wireless-only lines and should not be relied upon by the FCC in its forbearance analysis.

Conclusion

Granting Section 10 forbearance permanently affects local market conditions. As such, it is important that the Commission have confidence in its market analysis, including – to the extent that any wireless calculation is appropriate – the Commission's estimate of wireless-only penetration. This report recommends four requirements that any estimate should satisfy before the estimate should be relied upon by the FCC in conducting its forbearance analysis. As additional data becomes available, further refinements in methodology may be appropriate; at this time, however, these requirements should be viewed as the minimum reforms needed before wireless-only data is considered in any wireline forbearance request.

---

[25] Economic Areas are collections of counties aggregated by the Bureau of Economic Analysis to report regional economic statistics. Each Economic Area consists of one or more Economic Nodes - metropolitan areas or similar areas that serve as centers of economic activity - and the surrounding counties that are economically related to the nodes. The main factor used in determining the economic relationships among counties is commuting patterns, so each Economic Area includes, as far as possible, the place of work and the place of residence of its labor force.

[26] Specifically, simple linear regressions between the Telephia estimate of wireless-only penetration (as the dependent variable) and wireless penetration (single independent variable), or wireless subscribers and EA population (two independent variables), failed to establish a statistically-significant relationship. While primitive, the absence of any relationship between the wireless-only estimate and the penetration of wireless more generally casts further doubt on the reliability of the Telephia survey, particularly with respect to an issue as important as forbearance.