

particular concern given that broadband investments “are very long term in nature.”⁵ The Report quotes the Justice Department as endorsing its search for wireless “policy levers,” but the quoted passage had nothing to do with the wireless marketplace in which the Department has consistently supported deregulatory policies.⁶

The Commission should not continue down this counterproductive path in the *Fifteenth Report*. The Commission has a well-established, four-part mode of inquiry for determining whether wireless competition is “effective”: it examines market structure, market performance, provider conduct, and consumer behavior. As the remainder of these comments shows, the *Fourteenth Report* should have found that each of these measures strongly supported a finding of effective competition, and more recent developments even more strongly support such a finding in the *Fifteenth Report*.

The U.S. wireless industry structure all but guarantees the intensely competitive performance that is so readily observable. There are four nationwide facilities-based providers

⁵ Communications Daily, *Regulatory Uncertainty Created by FCC Seen Limiting Network Investment*, July 15, 2010 (quoting Citigroup Managing Director Mike Rollins as saying “Investors like certainty and visibility of policy,” and “[t]he reason it’s so important in telecom is those investments are very long term in nature. You put a dollar of capital in the ground for broadband today and the payback could be at least three to five years, in more cases than not, it’s five to ten”); Yu-Ting Wang & Howard Buskirk, *Reclassification Said to Pose Broad Risk to U.S. Economy*, Communications Daily, at 1 (June 14, 2010) (Jonathan Chaplin of Credit Suisse explaining that “[t]he biggest disconnect between Washington and Wall Street is on how the competitiveness of the industry is viewed. . . . Competition is doing its job and regulations would make it very difficult for companies to get reasonable return on investment. . . . The threat of regulation could discourage investment and cost jobs[.]”); Anna-Maria Kovacs, *Telecom Regulatory Note: D.C. Circuit vacates FCC’s Comcast network-management order*, Regulatory Source Associates, LLC, at 2 (Apr. 7, 2010) (“[W]e would expect the industry – telco, wireless, and cable –to assess capital investments from this point in light of the potential for new and more extensive regulations.”). See also DOJ 1/4/10 Ex Parte at 28 (even in monopoly or duopoly wireline situations “[a]lthough enacting some form of regulation to prevent certain providers from exercising monopoly power may be tempting, care must be taken to avoid stifling the infrastructure investments needed to expand broadband access.”).

⁷ *Fourteenth Report* ¶¶ 27-30.

(with a burgeoning fifth and sixth, Clearwire and SkyTerra), a number of substantial and quickly growing regional providers (such as Leap and MetroPCS), and over one hundred smaller facilities-based providers.⁷ There are also at least 60 MVNOs, including the fifth largest provider in the nation, Tracfone.⁸ There is significant new entry and much expansion by established providers into new markets, from Clearwire, Leap, MetroPCS, Cox, and others, with exit limited to Commission-approved mergers that were found to *benefit* consumers by, among other things, bringing new competitive offerings to more rural areas. More Americans today have more wireless choices than ever: 273 million people, or 95.8% of population, are served by at least three facilities-based wireless providers,⁹ and the number served by at least two wireless broadband networks increased from 73% in 2008 to 90% in 2009.¹⁰

The Report's summaries and press releases downplay this good news in favor of makeshift HHI calculations. As the text of the Report notes, however, it is universally recognized that such concentration calculations do not measure the effectiveness of competition, but are, at most, an initial screen to identify mergers that may merit additional analysis.¹¹ And here, additional analysis confirms that both the absolute level of the calculated "weighted average" HHI and the recent trend are fully consistent with the effective competition that is evident from observed market performance. Higher concentration is both expected and

⁷ *Fourteenth Report* ¶¶ 27-30.

⁸ *Id.* ¶ 33.

⁹ *Id.* ¶¶ 44-45.

¹⁰ *Id.* ¶ 47.

¹¹ *Id.* ¶ 55 ("market concentration, by itself, is an imperfect indicator of market power"); *see also id.* ¶ 48 (HHI is used principally as an initial "screen" in merger cases and is useful only "together with firm conduct and actual industry performance"). Moreover, as the Report notes, the Justice Department employs a significantly higher initial HHI screen of 2800 in wireless merger cases. *Id.* ¶ 49 & n.109.

beneficial in capital-intensive industries like wireless. Indeed, the American wireless marketplace is the least concentrated among all OECD countries, and U.S. consumers directly benefit from the scale economies reflected in the large customer bases of the leading providers. And the modest HHI increase observed from 2007 to 2008 (after modest decreases in prior years) is, upon examination, the product of *intensified*, not reduced, competition: (1) customers taking advantage of competitive rivalry to switch to the carriers that offer them the best value propositions, and (2) mergers that the Commission expressly found to benefit the public. In all events, the Commission’s approach of jumbling together local HHIs that vary widely between urban and rural areas to obtain a national “average” and ignoring MVNOs altogether provides a highly misleading and overstated view of actual market concentration.

The second factor – observed market performance – like market structure, demands a finding that competition is effective. Subscriberhip increased by six percent to an all-time high, 277 million, which represents a 90 percent penetration rate.¹² Smaller providers like Leap and MetroPCS increased their subscriber bases by 24 and 29 percent, respectively in 2009 – in both cases, gaining more new customers than either Sprint or T-Mobile – and continue rapidly to expand their coverage and customer bases.¹³ Average minutes of use remain high, text messaging traffic has grown exponentially (to 740 billion messages in the first half of 2009), and

¹² *Id.* ¶ 155.

¹³ *Id.* ¶ 175 & Chart 20. See also MetroPCS Reports First Quarter 2010 Results, *Record First Quarter Adjusted EBITDA and Net Subscriber Additions* (May 6, 2010) (“With this strong customer response to our Wireless for All plans, our consolidated subscriber base grew dramatically: over 10% during the first quarter. Also, over the past 12 months, in the midst of a weak economy and an increasingly competitive landscape, we have grown our subscriber base by over 21%. . . . We believe our new initiatives including our deployment of 4G LTE, and our focus on providing a post-pay experience on a no-signed contract, unlimited, flat-rate basis, improves our competitive position now and in the future.”); Leap Press Release, *Leap Reports 446,000 Net Customer Additions for Cricket Services in First Quarter 2010* (May 6, 2010).

wireless data traffic is through the roof (an estimated 85 terabytes in 2009).¹⁴ And consumers receive much more for every dollar they spend than in previous years.¹⁵

Here, again, though, the *Fourteenth Report* strains to find the dark lining in the silver cloud, focusing on misleadingly gloomy discussions of capital expenditures and the new category of accounting “profitability.” Far from representing a sign of diminished competition, the extraordinary level of industry capital expenditures is all the more remarkable given that it occurred in the most severe recession since the great depression. And, beyond that, the Commission’s calculations exclude entire categories of investment, including expenditures for spectrum, investments made for services that had not been turned up (thus excluding investment for geographic expansion into new service areas and investments for new technologies like LTE), and the substantial investments by those other than the largest providers. Moreover, the *Fourteenth Report’s* own tables show that even under this incomplete view, all of the major wireless providers *increased* their capital expenditures except for Sprint, which experienced a precipitous decline in investment as it shifts to a reliance on Clearwire – a single firm decline that completely explains the slight decline overall. Of course, given the inherent “lumpiness” of long-term network investments – investment may be higher one year as networks are upgraded to a new technology and lower the next year – it would be nonsensical to draw negative conclusions even if *every* firm experienced a single year decline in the level of its capital investment. And the Report itself acknowledges why EBITDA comparisons (a measure for which no GAAP standard exists) could not aid the effective competition inquiry even if a match between accounting, and true economic profits, could be assumed: in an industry defined by capital intensity, EBITDA comparisons ignore variations in firms’ investment activity that preclude

¹⁴ *Fourteenth Report* ¶¶ 176-83.

¹⁵ *Id.* ¶¶ 202-06.

apples-to-apples comparison.¹⁶

Provider conduct also confirms robust competition. The *Fourteenth Report* describes the many ways in which wireless providers compete vigorously to offer innovative pricing plans¹⁷ and the rapid growth of prepaid service plans.¹⁸ The Report also details the wireless industry's enormous investments to extend coverage and to upgrade the technology of their networks.¹⁹ If anything, this competitive activity has accelerated since the report was released, with providers continuing to expand and upgrade their networks, improve their pricing plans, and offer an ever increasing array of cutting edge devices and applications. Wireless providers have also intensified their efforts to differentiate themselves through partnerships with device manufacturers and operating system designers, and those trends are continuing today with the recent introduction of phones like the iPhone 4, Droid X, and HTC EVO, as well as data-only devices like the iPad – with the result that wireless consumers are able to do far more with their wireless services than ever before. The only “negative” the Report can find is a slight decrease in total advertising spending in 2008, but here too, the real story is unambiguously positive. Although absolute amounts declined slightly in 2008, the wireless industry actually *increased* its advertising relative to other industries (as the Report notes, at ¶ 129), and because the cost of advertising decreased substantially during this recessionary time period, the wireless industry actually engaged in *more* advertising, not less.

¹⁶ *Id.* ¶¶ 215-18.

¹⁷ *Id.* ¶ 88 (“the pricing conduct of mobile wireless providers in 2009 and early 2010 included changes in the monthly price of service plans, the attachment of additional features to existing plans, the introduction of new pricing options for customers who choose to forego discounted handsets, and the launch of new unlimited prepaid service offerings”); *see also id.* ¶¶ 89-92, Table 10.

¹⁸ *Id.* ¶¶ 98-103.

¹⁹ *Id.* ¶¶ 105-23.

Finally, consumers clearly know how to vote with their feet to find the best values and bargains. Wireless consumers have many sources of information about wireless services. Rates of satisfaction are high,²⁰ and although the Report does not highlight it, consumer complaints are at an all-time low. Churn rates confirm again that consumers frequently switch providers; indeed, approximately one quarter of customers switch their service providers each year and whatever “switching costs” may exist plainly are not an impediment to competition.²¹

In short, the Commission should abandon the search for a dark lining in the silver wireless cloud and return to its historic practice of answering the question Congress asked based upon the real marketplace facts: the wireless marketplace plainly is effectively competitive.

I. MARKET STRUCTURE CONSIDERATIONS CONFIRM THAT THE WIRELESS MARKETPLACE IS INTENSELY COMPETITIVE.

Historically the Commission has begun its analysis with an assessment of “market structure.” In the *Fourteenth Report*, the Commission presented extensive evidence that the wireless marketplace is fully open to effective competition. More Americans have more competitive choices than ever, as almost all Americans can choose from at least three facilities-based providers, and the vast majority can choose from at least five. The Commission has also taken action to remove regulatory barriers to entry, particularly with regard to tower siting approvals, which has made the marketplace even more conducive to competition.

The Commission’s summary and press releases, however, scrupulously de-emphasize these facts in favor of the Commission’s calculations of HHI. They do so, moreover, even though it is well-settled among economists and antitrust regulators that measures of market

²⁰ *Id.* ¶¶ 231-32; *see also, e.g.*, John Horrigan, Ellen Satterwhite, FCC Survey, *Americans’ perspectives on online connection speeds for home and mobile devices*, at 1, available at http://www.fcc.gov/Daily_Releases/Daily_Business/2010/db0601/DOC-298516A1.pdf (finding that 92 percent of customers were satisfied with their mobile wireless service).

²¹ *Id.* ¶¶ 244-48.

concentration (even assuming they are accurate) are not conclusory as to whether a market is competitive.²² Rather, the HHI is intended to be an initial screen used in merger proceedings, a starting point for analysis used to determine which markets are worthy of further investigation. By exalting the HHI to a status it does not warrant and de-emphasizing the marketplace facts that demonstrate vigorous competition, the *Fourteenth Report* – and, in particular, the Executive Summary and press releases attending its release – paint a distorted view of competition in the wireless marketplace.

Ironically, a proper, if myopic, focus on HHI does not, in all events, suggest a market structure that is not conducive to competition. This year's slight increase in HHI is due entirely to pro-competitive factors (mergers that were found to be in the public interest and gains by carriers that did what they are supposed to do in a competitive marketplace – compete to win customers from their rivals), and the HHI is still well within a range that is consistent with effective competition (indeed, the American wireless marketplace is the least concentrated among the leading industrialized nations in the world). Moreover, the way the Commission calculates weighted average HHIs is highly misleading, because it uses a “weighted average” of the HHIs in each EA, which hides the fact that most people live in areas with significantly lower HHIs and ignores the significant competitive force of MVNOs altogether.

The *Fourteenth Report* also raises questions about the fact that AT&T and Verizon own significant amounts of spectrum below 1 GHz, and whether the fact that such spectrum can have superior propagation characteristics than spectrum above 1 GHz raises competitive concerns. As shown below, this is a red herring. First, it was the introduction of high-band PCS spectrum that

²² It is well known, for example, that markets displaying very little concentration (*e.g.*, real estate agents) may fail to perform competitively, while markets displaying extremely high concentration (*e.g.*, large jetliners) may be extremely rivalrous.

revolutionized the industry, not sub-1 GHz spectrum. Second, the *Fourteenth Report* fails to account for the advantages of high-band spectrum, including the fact that it can provide greater capacity, is available in larger blocks, and that there is more of it. Third, experience proves that pro-competitive spectrum policies that auction flexible use licenses to those that value them most have promoted, not hindered, entry and expansion, and that attempts by other countries to micromanage spectrum allocations have either been abandoned or proved to be monumental failures.

A. The Facts In The *Fourteenth Report* Confirm That Wireless Market Structure Promotes Robust Competition.

The *Fourteenth Report* collects an abundance of competitive *facts* that all point in the same direction: the wireless marketplace is wide open to competition. There continue to be four strong national wireless providers and dozens of regional and local providers, and these smaller providers are the fastest growing.²³ The vast majority of these wireless providers offer national coverage, using a combination of their own facilities and roaming arrangements.²⁴ As described below, the *Fourteenth Report* documented expansive new entry by well-financed competitors, as well as the continued expansion of more than 60 Mobile Virtual Network Operators (up from 40 in the *Thirteenth Report*) that lease airtime from facilities-based providers and use it to compete intensely against facilities-based providers. Indeed, the fifth largest provider in the U.S. is an MVNO.²⁵ In addition, the *Fourteenth Report* confirms that (again) the U.S. wireless industry is the least concentrated of the 26 major industrialized countries followed by the OECD, and that

²³ *Fourteenth Report* ¶ 27; *Fourteenth Report* ¶ 175 (“MetroPCS and Leap, while smaller than the top four providers, increased their subscriber bases by about 24 and 29 percent, respectively in 2009,” each of which is a substantially greater increase than any other provider); *see also id.* ¶ 72.

²⁴ *Fourteenth Report* ¶ 29.

²⁵ *Id.* ¶ 33.

remains true today.²⁶

Given the dozens of carriers competing in the marketplace, it should come as no surprise that the vast majority of Americans, even in remote rural areas, have lots of competitive choices. The *Fourteenth Report* shows that 96.1% of U.S. customers can choose among at least three wireless voice competitors, 91.3% can choose among at least four wireless voice competitors, and that 74.4% of U.S. consumers can choose among at least 5 voice competitors.²⁷ All of these numbers are up significantly from the *Thirteenth Report* and represent all-time highs.²⁸ Moreover, the level of choice is not appreciably different in rural areas: the Commission specifically found that in areas “with a population density of 100 persons or fewer per square mile,” “the percentage of the rural population with coverage by one or more providers (98.5 percent), or two or more providers (94.5 percent) is comparable to coverage for entire U.S. population” (¶ 353) and that 83.1% of these rural customers have access to 3 or more competitors. Again, these metrics are all *up* compared to the *Thirteenth Report*.²⁹

The same is true for wireless broadband services. For the first time, the Commission provided statistics on the percentage of consumers with access to competing broadband providers, and these numbers too are very impressive. The *Fourteenth Report* shows (Table 7) that almost all – 98.1 percent – U.S. consumers have access to wireless broadband services, almost 90 percent can choose among at least 2 competitors, almost 75 percent can choose among at least three competitors, and nearly 60 percent can choose among four or more. The report

²⁶ *Fourteenth Report* ¶ 365, Table 41; CTIA Slide Presentation, *Mobile Wireless Competition in the U.S.*, at 5 (May 11, 2010) (attached to *Ex Parte* Letter from Christopher Guttman-McCabe (CTIA) to Marlene H. Dortch (FCC), GN Docket No. 09-157 (dated May 10, 2010)) (“CTIA May 2010 Wireless Market Statistics”).

²⁷ *Fourteenth Report* ¶ 42, Table 5.

²⁸ Compare *Fourteenth Report* ¶ 42, Table 5 with *Thirteenth Report* ¶ 42, Table 2.

²⁹ *Fourteenth Report* ¶ 354.

confirms (Table 39) that the numbers for rural areas with 100 or fewer consumers per square mile are also improving quickly: more than 92 percent of such consumers have access to mobile broadband services, and 61.8 percent can choose among at least two alternative providers. And, of course, consumers in rural areas have access to fixed broadband services as well.

The openness of the marketplace is not mere conjecture – it is confirmed by the indisputable *fact* of substantial new entry. The *Fourteenth Report* describes in detail (¶¶ 69-73) new entry and expansion into new areas by Clearwire (using Wi-Max technology), Cox Communications (CMRS, EV-DO, LTE), and Leap and MetroPCS (CMRS, EV-DO, and LTE). The comments submitted by CTIA in this proceeding provide additional data showing that providers are continuing to enter, expand, and upgrade their networks in 2010, resulting in more and better choices for consumers. For example, at the end of 2009, Clearwire provided its Wi-Max service in 27 markets covering about 34.5 million people.³⁰ In early 2010, Clearwire expanded to 44 markets, covering about 51 million people,³¹ and expects to enter 19 more markets this summer and 10 additional markets by the end of 2010.³² Clearwire has already added more subscribers in the first quarter of 2010 than it did over the entire year in 2009.³³

In addition, Harbinger recently committed, as a condition of its acquisition of Skyterra, to deploy a nationwide mobile wireless network that will cover 90 percent of the U.S. customers with a terrestrial 4G network and 100 percent of U.S. customers using a satellite network.³⁴

³⁰ *Fourteenth Report* ¶ 70.

³¹ Clearwire website, <http://investors.clearwire.com/phoenix.zhtml?c=214419&p=irol-corporoverview>.

³² Clearwire New Release, Clearwire Reports Strong First Quarter 2010 Results (May 5, 2010), available at <http://investors.clearwire.com/phoenix.zhtml?c=198722&p=irol-newsArticle&id=1422880>.

³³ *Id.*

³⁴ Memorandum Opinion And Order And Declaratory Ruling, *SkyTerra Communications, Inc.*,

Harbinger has already raised \$1 billion in financing for this project, and it recently “entered into a \$7 billion, eight-year agreement with Nokia Siemens Networks to build, install and operate Harbinger’s terrestrial satellite mobile broadband network.”³⁵ This agreement “lay[s] to rest some of the questions that have surrounded Harbinger’s ambitious system deployment plan since the company guaranteed its layout schedule to the [Commission].”³⁶

By contrast, the *Fourteenth Report* identifies *no* competitively harmful exit in the mobile wireless marketplace. Rather, as discussed further *infra*, all of the “exits” identified in the *Fourteenth Report* are the result of mergers and acquisitions that were scrutinized by the Commission and the Justice Department and conditioned on divestitures and other remedies to ensure that they did not result in undue concentration.³⁷

Transferor and Harbinger Capital Partners Funds, Transferee; Applications for Consent to Transfer of Control of SkyTerra Subsidiary, 25 FCC Rcd. 3059, ¶ 56 (2010) (“*Harbinger/Skyterra Merger Order*”) (“Harbinger’s network will cover 100 percent of the U.S. population via the satellite component and ultimately over 90 percent of the population via its terrestrial component. Service will begin in two trial markets with a commercial launch commencing before the third quarter of 2011, providing service for up to 9 million POPs. Excluding satellite coverage, Harbinger has committed to a build-out schedule of its 4G terrestrial network that will provide coverage in the United States to at least 100 million people by December 31, 2012, at least 145 million people by December 31, 2013, and at least 260 million people by December 31, 2015.”).

³⁵ Peter B. de Selding, *Harbinger Strikes Deal with Nokia Siemens for SkyTerra Ground Network*, Space News (July 20, 2010), available at http://www.spacenews.com/satellite_telecom/100720-harbinger-deal-nokia.html; see also *id.* (“Harbinger earlier had agreed to invest \$2.9 billion into the project, now called LightSquared. The company also has agreed to inject an additional \$750 million in equity. To this sum will be added \$1 billion in debt or equity whose source Harbinger and LightSquared declined to name.”).

³⁶ *Id.* (“In exchange for the FCC’s approval of Harbinger’s acquisition of SkyTerra of Reston, Va., which is building two large L-band mobile services satellites, Harbinger promised that the multibillion-dollar ground network, consisting of some 40,000 cellular towers to work in concert with the satellites, would reach 260 million Americans by 2015.”).

³⁷ *Fourteenth Report* ¶ 75 (“In markets where the entities were significant competitors, the Commission may have required divestitures in specified markets as conditions of the transaction in order to prevent competitive harm.”).

The *Fourteenth Report* also documents various Commission actions to remove regulatory barriers to entry and expansion. First, the Commission adopted new rules to reduce delays in tower siting caused by state and local requirements, which “sets time frames for state and local zoning authorities to act on a zoning application” and “reduce[s] regulatory barriers to entry by finding that it is a violation of the Communications Act for a state or local government to deny a wireless service facility-siting application because service is available from another provider.”³⁸ Second, the Commission developed a plan to make significant amounts of additional spectrum available to wireless providers.³⁹ Since the *Fourteenth Report*, the Commission has also initiated a rulemaking to remove restrictions on the use of Mobile Satellite Services spectrum for terrestrial wireless services.⁴⁰

Finally, the *Fourteenth Report* confirms again that the Commission’s flexible and market-oriented spectrum policies have fostered entry and have allowed wireless providers to respond quickly and efficiently to rapidly evolving consumer demand. As the report explains, new entrants have many ways to access spectrum, “including purchasing spectrum at Commission auctions, purchasing spectrum in the secondary market, and leasing spectrum in the secondary market,” and that entire firms, such as Spectrum Bridge, are devoted entirely to facilitating secondary market transactions with “online market places for spectrum exchange.”⁴¹ As a result, “spectrum acquisitions [using these various means] have enabled certain operators – including Leap, MetroPCS, and T-Mobile – to expand networks into new markets, and to

³⁸ *Id.* ¶ 59.

³⁹ *Id.*

⁴⁰ Notice of Proposed Rulemaking & Notice of Inquiry, *Fixed Mobile Servs. in the Mobile Satellite Service Bands at 1525-1559 MHz & 1626.5-1660.5 MHz, 1610-1626.5 MHz & 2483.5-2500 MHz, & 2000-2020 MHz & 2180-2200 MHz*, ET Docket No. 10-142 (rel. July 15, 2010).

⁴¹ *Fourteenth Report* ¶ 62.

improve and enhance networks in existing markets.”⁴² And the Commission’s efforts to free up more spectrum for mobile wireless use promise to facilitate further competitive entry and expansion.

B. The Report’s Focus On A Supposed Increase In “Concentration” Is Both Misguided and Misleading.

Although the Report itself confirms that the wireless marketplace is conducive to robust competition, the “headline” in the Commission’s summaries and press releases accompanying the Report is that market concentration has supposedly increased,⁴³ and the Commission buries in the back of its report the fact that the United States has the lowest concentration among OECD countries.⁴⁴ Indeed, the Commission goes out of its way to emphasize that by “one widely-used measure of industry concentration” – the Herfindahl-Hirschman Index (“HHI”) – concentration increased by 32 percent in the last five years and by 6 percent in the past year.⁴⁵ There is no defensible basis for concern, however, because (1) HHIs are merely a screen for merger analysis that say nothing about the effectiveness of competition, and the facts here show that the slight increases were due to pro-competitive developments, and (2) the Commission’s method of calculating HHIs is inaccurate and misleading in all events.

The Facts Here Dispel Any Concern About the HHI. The HHI is an analytical tool developed for use in merger proceedings. It is a starting point for determining whether a merger “is likely to create or enhance market power or to facilitate its exercise.”⁴⁶ As economists have

⁴² *Id.* ¶ 107.

⁴³ *Id.* ¶ 4.

⁴⁴ *Id.* ¶ 365, Table 41.

⁴⁵ *Id.* ¶ 4.

⁴⁶ U.S. Department of Justice and Federal Trade Commission, *Horizontal Merger Guidelines*, § 0.2.

explained, however, the “Merger Guidelines approach . . . was not designed to measure the existence of market power.”⁴⁷ Indeed, the Guidelines take current price levels and the existing level of competition as a given; they do not provide any means for determining whether the market is in fact competitive or whether current price levels are competitive.⁴⁸ Concentration metrics are meaningless by themselves,⁴⁹ and it has thus been “many years since anyone knowledgeable about” competitive analysis “thought that concentration by itself imported a diminution in competition.”⁵⁰

Even in the context of a merger review, the HHI is merely an initial screen, to determine whether it would be useful to take a closer look at the actual marketplace facts.⁵¹ As explained by the Commission, “[i]n evaluating the competitive effects of this transaction, our initial [HHI] screen eliminates from further review those markets in which there is clearly no competitive harm relative to today’s generally competitive [wireless] marketplace.”⁵² Concentration

⁴⁷ Reply Declaration of Dennis W. Carlton, Allan L. Shampine, & Hal S. Sider, ¶ 53 (Exhibit A to Reply Comments of AT&T Inc., *Special Access Rates for Price Cap Local Exchange Carriers*, WC Docket No. 05-25 (filed Feb. 24, 2010)) (“Carlton-Shampine-Sider Reply Decl.”) (emphasis in original).

⁴⁸ *Id.* ¶ 54.

⁴⁹ *See, e.g.*, Declaration of Michael Katz, ¶¶ 16, 23 (“Katz Decl.”) (“measures of concentration suffer from several drawbacks that limit their usefulness or invalidate them as stand-alone indicators,” and “it would be a mistake to simply assume that the market in question is not effectively competitive” merely based on such indicators) attached to Reply Comments of AT&T Inc., *Wireless Telecommunications Bureau Seeks Comment On Commercial Mobile Radio Servs. Market Competition*, WT Docket No. 09-66 (filed July 12, 2009); *see also Fourteenth Report* ¶ 48 (pointing out that HHI measures are useful only when “evaluated together with firm conduct and actual industry performance”).

⁵⁰ *Capital Cities/ABC, Inc. v. FCC*, 29 F.3d 309, 315 (7th Cir. 1994); *U.S. v. Syufy Enters.*, 903 F.2d 659, 665-66 (9th Cir. 1990) (“In evaluating monopoly power, it is not market share that counts but rather, the ability to *maintain* market share”) (emphasis in original).

⁵¹ *See id.*, ¶¶ 16-30.

⁵² Mem. Op. & Order, *Applications of AT&T Inc. & Centennial Communications Corp. For Consent to Transfer Control of Licenses, Authorizations, & Spectrum Leasing Arrangements*, 24

measures “are the beginning, not the end, of the competitive analysis” because they merely provide “information as to which markets need more in-depth, multidimensional analysis of potential anticompetitive effects.”⁵³ And the DOJ and FTC are affirmatively moving *away* from rigid use of the HHI in analyzing the potential impact of mergers; the revised draft of the Guidelines now emphasizes that concentration measures do not “provide a rigid screen to separate acceptable mergers from anticompetitive transactions” but instead only “provide one way to identify those mergers for which it is particularly important to examine whether other competitive factors confirm, reinforce, or would counteract the potential harmful effects of increased concentration.”⁵⁴

Because the HHI is only the starting point of a market structure analysis in the context of a merger review proceeding, the *Fourteenth Report*'s emphasis of HHI data, particularly in the face of so much evidence of vigorous actual competition, was improper. Even if these findings with regard to the HHI were accurate and complete, these findings would not trump the compelling data demonstrating that actual wireless competition is as robust as ever, if not more so. But, in fact, the analysis of concentration in the *Fourteenth Report* is woefully incomplete. The Commission makes much of the fact that its estimate of the average HHI increased by 6 percent (even though the HHI has been essentially stable for several years),⁵⁵ but an examination of the actual marketplace facts confirms that the small increase in HHI was due to two factors,

FCC Rcd. 13915, ¶ 46 (2009) (“*AT&T-Centennial Order*”).

⁵³ Memorandum Opinion & Order, *Applications of AT&T Wireless Services, Inc. and Cingular Wireless Corporation; For Consent to Transfer Control of Licenses and Authorizations*, 19 FCC Rcd. 21522, ¶ 96 (2004) (“*AT&T-Cingular Merger Order*”).

⁵⁴ Draft Horizontal Merger Guidelines, at 19.

⁵⁵ The statement that HHI's have increased by 32% since 2003 (*Fourteenth Report* ¶ 4) is misleading, because the vast majority of that increase occurred from 2003 to 2005. The HHI has been stable and fluctuating in a narrow range since, and actually had been declining prior to 2008.

both of which are pro-competitive: Commission-approved mergers and competitive wins in the marketplace.

As the *Fourteenth Report* notes, one of the main factors contributing to the 6% increase in HHI levels was a series of mergers that occurred in 2008.⁵⁶ The Commission approved these mergers only after considering the mergers' impact on competition and adopting appropriate conditions that "prevent[ed] *entirely* consolidation in individual markets from advancing to a point at which it would threaten competition and potentially harm consumers."⁵⁷ The Commission thus concluded that each of these mergers "would serve the public interest, convenience, and necessity."⁵⁸ For example, in the Verizon-Alltel merger, the DOJ and the Commission required, as a condition of their approval, that Verizon and Alltel divest spectrum and other assets in every area where the merger would have reduced the number of wireless competitors to three or fewer.⁵⁹ These mergers have manifestly benefited consumers and intensified competition – often resulting in a national or large regional provider entering a rural or underserved area, bringing customers in those areas access to the same wireless services and products that are available to customers in the most densely populated areas.⁶⁰

⁵⁶ *Fourteenth Report* ¶ 51. These mergers include "AT&T/Aloha (August 2008), T-Mobile/Suncom (February 2008), Verizon Wireless/Rural Cellular (August 2008), and Verizon Wireless/Alltel (January 2008)." *Id.*

⁵⁷ Mem. Op. & Order & Declaratory Ruling, *Applications of Cellco Partnership d/b/a Verizon Wireless and Atlantis Holdings LLC; For Consent to Transfer Control of Licenses, Authorizations, and Spectrum Manager and De Facto Transfer Leasing Arrangements and Petition for Declaratory Ruling that the Transaction is Consistent with Section 310(b)(4) of the Communications Act*, 23 FCC Rcd. 17444, ¶ 4 (2008) ("Verizon-Alltel Merger Order") (emphasis added).

⁵⁸ *Id.* ¶ 3.

⁵⁹ *Id.* ¶ 101.

⁶⁰ *See, e.g., Id.* ¶ 119-156 (these transactions "result in expanded and improved services and features for wireless customers, especially in rural areas," "increased broadband deployment and next generation services," "higher quality service," and "increase[d] efficiency and . . .

The other main reason why the HHIs increased slightly from 2007 to 2008 is that the certain providers gained market share in some EAs by successfully winning customers from other providers in the normal back and forth as providers compete for customers – a hallmark of competition, not a lack of it. For example, Sprint, due to a number of factors, lost millions of customers to rivals that offered them better services, a trend that Sprint has only recently begun to curb the old-fashioned way: by advertising lower prices, better service and more amenities.⁶¹ Individual provider fortunes ebb and flow, but the increased concentration that results from these market share increases and decreases must be recognized for what it is: confirmation of an effectively competitive marketplace.

In all events, even relatively “high” measures of “concentration” are fully compatible with a vigorous competitive wireless industry. The current FTC and DOJ economists have strongly criticized any attempt to “link[] increases in concentration to declines in market performance,” explaining that “[i]n recent decades . . . industrial organization scholars and the courts have been more apt to stress that high concentration can be compatible with vigorous competition and efficient market performance.”⁶² Study after study shows that “a number of U.S. industries – including several that nearly all would regard as competitive – are relatively concentrated” as measured by HHIs.⁶³ And, as Professor Dennis Carlton has explained, the DOJ

economies of scale and scope.”).

⁶¹ See Sprint News Release, *Sprint Nextel Reports Second Quarter 2010 Results* (July 28, 2010), available at <http://investors.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle&ID=1452819&highlight=> (“The company achieved its best year-over-year quarterly improvement in postpaid gross subscriber additions in more than five years”).

⁶² Joseph Farrell & Carl Shapiro, *Antitrust Evaluation of Horizontal Mergers: An Economic Alternative to Market Definition*, at 4 (Working Paper, Nov. 25, 2008).

⁶³ George Ford, Thomas M. Koutsky, Lawrence J. Spiwak, *Competition after unbundling: entry industry structure, and convergence*, *Federal Communications Law Journal*, at 339 (March 2007) (For example, the household refrigerator and freezer business has an HHI of over 2000,

and FTC have chosen not to challenge large portions of merger proceedings with concentration ratios of 3000 and higher.⁶⁴

High HHIs are particularly commonplace in markets that, like wireless, are characterized by high sunk costs and large economies of scale and scope.⁶⁵ “As consistently demonstrated by academic research, given the huge fixed and sunk costs inherent to the construction and commercial operation of communications networks, the equilibrium level of concentration of terrestrial firms in the local communications markets (voice, video, and data) will be relatively high.”⁶⁶ When the Commission has previously reported CMRS HHIs, it has cautioned that, where “the scale [or] output at which a firm can fully exploit scale economies (the minimum efficient scale) is large relative to potential demand, there will be room in the market for only a small number of firms operating at the lowest possible cost” and, as a result, “market concentration in such industries will tend to be high relative to industries characterized by greater potential demand or smaller minimum efficient scale.”⁶⁷ Similarly, when reviewing wireless mergers, the Commission employs a “screen” under which it has determined that where the merger will result in an HHI below 2800 and will not increase the HHI by more than 250, “there is clearly no competitive harm in today’s generally competitive marketplace.”⁶⁸

silverware manufacturing has an HHI of nearly 2800, and glass container manufacturing has an HHI of 3000).

⁶⁴ Dennis W. Carlton, Comment on Department of Justice And Federal Trade Commission’s Proposed Horizontal Merger Guidelines, ¶ 12 (filed June 4, 2010).

⁶⁵ See Katz Decl. ¶¶ 21-23, 30.

⁶⁶ George Ford, Thomas M. Koutsky, Lawrence J. Spiwak, *Competition after unbundling: entry industry structure, and convergence*, Federal Communications Law Journal, at 4 (March 2007).

⁶⁷ *Ninth Report* ¶ 55; see also *Tenth Report* ¶ 47; *Eleventh Report* ¶ 46; *Twelfth Report* ¶ 53; *Thirteenth Report* ¶ 48.

⁶⁸ Memorandum Opinion & Order, *Applications of Wireless Telecommunications, Inc., Debtor-In-Possession, Assignor and The Vermont Telephone Company, Inc., Assignee*, 24 FCC Rcd.

Here, according to the data in Appendix C to the *Fourteenth Report*, more than 70 percent of the U.S. population is located in EAs with an HHI below 2800. The remaining 30 percent are typically located in much more rural areas that can support fewer firms than less rural areas. The HHIs in many of these areas, however, would fall below 2800 if the calculation included MVNOs. Even without MVNOs, virtually all of these areas still have three or more facilities-based competitors (*see Fourteenth Report*, Table 5), and at least one of these competitors is typically a national competitor. AT&T and other national competitors offer the same services, devices options, voice plans, data plans, and other benefits throughout their service areas, and thus consumers in these areas benefit from the same nationally available pricing and options that are offered to more urban consumers. HHIs are just a starting point for analysis, and the actual *facts* concerning the wireless marketplace confirm that “concentration” poses no legitimate issue for the openness of competition in this marketplace.

The Commission’s HHIs Are Inaccurate and Misleading. Beyond that, the HHI figure used in the *Fourteenth Report* is not actually an HHI. Rather, it is a weighted average, by population, of the HHIs of each Economic Area (“EA”) across the country. A proper HHI statistic is the sum of the squares of the market shares of each provider in the market being examined. The Commission’s approach of arbitrarily dividing providers’ market shares among different EAs and then recombining them through weighted averaging does not produce an HHI metric at all, but rather a largely meaningless, Frankenstein statistic that of mathematical necessity will produce higher HHI metrics than properly calculated national HHI statistics.

The Commission’s “weighted average” hides the reality of the wireless marketplace. The overall HHI of the wireless marketplace, taken as a national market, is far below 2800 (about

3177, ¶¶ 15-16 (2009).

2200 by one estimate cited in the *Fourteenth Report*).⁶⁹ Similarly, the vast majority of Americans live in EAs that have HHIs well below 2800. There is a small percentage of Americans who live in very rural areas that cannot support a large number of facilities-based providers, and HHIs are – predictably – significantly higher in those EAs. The Commission could reasonably look at either of these measures – *i.e.*, recognizing that national and regional wireless providers typically do not charge different prices or offer different service plans in different areas, it could accept that the national marketplace is remarkably unconcentrated, or it could do an EA specific analysis and acknowledge that very rural areas present special challenges that could perhaps be met with targeted subsidies or other similar measures. But what it cannot reasonably do is hide the reality in a “weighted average” that systematically increases the HHI calculations and thus effectively artificially inflates concentration of the entire national marketplace. Gerrymandering the market participants’ shares into smaller areas in this fashion, simply to create higher “local” market shares, which are then squared and averaged back into a “weighted average,” obfuscates the issues. In essence, the squaring of the rural market shares is dominating the effect of weighting the average by population, and the result is a misleading “average” that masks the fact that the vast majority of the nation lives in EAs with HHIs well below 2800.

The result is a false precision that actually produces no useful information. The Commission compares its weighted average to the thresholds used by the Commission, DOJ and other agencies when assessing ordinary HHI computations, but this is an apples-to-oranges comparison, because those agencies do not use those types of weighted averages in merger proceedings. The weighted average tells the Commission little about what is happening

⁶⁹ *Fourteenth Report*, Chart 41.

anywhere, either locally or nationally. For example, according to the Commission's data, the Chicago EA has one of the lowest HHI values for 2008 at 2140, which is actually *down* slightly from 2151 in 2007. The Burlington, Vermont EA has one of the highest 2008 HHIs at 8263, which is 73% higher than the 2007 HHI of 4776. When these values are averaged (weighted by EA population), the average 2007 HHI was 2309 and the average 2008 HHI was 2551, an increase of about 242 or 10.5%. But this statistic tells the Commission nothing about what happened in either Chicago (where HHIs went down) or Burlington (where HHIs are much higher), and combining figures like these provides no insight at all into the overall national market structure.

The Commission's methodology has other problems as well. Most notably, it does not count MVNOs. MVNOs are providers that purchase minutes from facilities-based providers and independently resell those minutes, along with substantial customer support, in competition with the facilities-based provider. MVNOs are among the largest and fastest growing competitors in the United States. Indeed, one MVNO, Tracfone, is the *fifth* largest wireless provider, in terms of subscribers, in the nation.⁷⁰

The Commission's analysis lumps MVNO customers into the total number of customers for the facilities-based provider from which the MVNO purchases its minutes (the "host provider"). But this fails to account for the significant competitive pressure that MVNOs actually place on facilities-based providers. MVNOs compete vigorously with innovative pricing plans, service offerings, customer support, devices, applications, and much else, and they routinely win customers from facilities-based providers, including their host providers. Host providers have strong incentives to compete vigorously against all MVNOs – including those for

⁷⁰ *Fourteenth Report* ¶ 33.

which it is the host provider – to win the retail customer. As the *Fourteenth Report* notes, “[a]nalysts see both the Straight Talk unlimited offering and the Boost Unlimited plan [both prepaid offerings by MVNOs] as competitive threats to [prepaid] unlimited players Leap and MetroPCS [both facilities-based providers].”⁷¹ The Commission’s failure to account for this very substantial source of competition in its average HHI statistics makes its conclusions even more unreliable.

C. The Commission’s Focused On The Allocation Of Spectrum Is A Red Herring.

The Commission’s historic policies of allocating spectrum under flexible licenses to the highest value user are in no small part responsible for the unprecedented levels of investment, innovation, and expansion in the wireless marketplace documented in the *Fourteenth Report* and throughout these comments. The *Fourteenth Report*, however, tries to turn this lemonade into lemons. The *Fourteenth Report* explains that spectrum below 1 GHz can have better propagation characteristics than spectrum above 1 GHz, and that competition therefore may be affected by the fact that providers with more sub-1 GHz spectrum may be able to deploy service using fewer cell towers than providers with spectrum above 1 GHz. This concern is clearly unwarranted, for several reasons.

⁷¹ *Id.* ¶ 102. For example, “[f]ollowing the launch of Tracfone’s low priced service offering, MetroPCS enhanced its unlimited local calling plan in August 2009 by reducing the monthly charges for add-on features such as text messaging and various other data services. Leap responded with similar changes to the pricing of add-on features for its Cricket service plans shortly thereafter. MetroPCS made another round of similar price cuts to add-on features in the fourth quarter of 2009, and Leap again followed suit. With each round of changes, MetroPCS and Leap lowered the monthly recurring charge for applicable features by five to ten dollars.” *Id.* ¶ 103. In addition, Sprint recently purchased Virgin Mobile USA – an MVNO – and explained that “Sprint is committed to growing its prepaid business and this transaction will provide us with the resources and opportunities to compete more aggressively, and strengthen our position in prepaid.” Sprint Press Release, *Sprint Nextel To Acquire Virgin Mobile USA* (July 28, 2009), available at http://newsreleases.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle_newsroom&ID=1312854.

First, history teaches that access to sub-1 GHz is hardly vital to competition. The introduction of 120 MHz of PCS spectrum at 1.9 GHz revolutionized the industry, clearly demonstrating that higher-band spectrum can and has played a significant role in fostering competition.

Second, the Commission's discussion completely fails to account for the capacity-centric deployments that network providers are designing today to support 3G and 4G services. Today, capacity and throughput (not propagation) are king. In this critical respect, the *Fourteenth Report* admits that spectrum *above* 1 GHz has distinct advantages, particularly in urban and suburban areas where there are significant sub-1 GHz spectrum constraints. For example, spectrum above 1 GHz can provide greater capacity in the geographic area it covers,⁷² it is available in larger blocks, and there is more of it.⁷³ In short, propagation characteristics are only one of many characteristics of spectrum, and pointing to one of its advantages without considering advantages of other spectrum provides no relevant insight into the competitive landscape.

Third, the notion that a lack of spectrum under 1 GHz is a barrier to entry or expansion is

⁷² See, *Fourteenth Report* ¶ 272 (“Conversely, higher frequency spectrum may be particularly effective for providing significant capacity, or increasing capacity, within a smaller geographic area. In certain situations, higher frequency bands can achieve greater improvements in capacity. For instance, capacity enhancement technologies such as MIMO may perform better at higher frequencies. . . . Thus higher-frequency spectrum can be ideally suited for providing high capacity where it is needed, such as high-traffic urban areas.”).

⁷³ *Id.* (“[I]n many parts of these higher bands, spectrum is licensed in larger contiguous blocks, which can enable operators to deploy wider channels and simplify device design”). The *Fourteenth Report's* assertion that improved propagation characteristics for sub-1 GHz spectrum can reduce the number of cell towers needed to cover an area and thus reduce costs is also flawed, because it fails to account for the many other cell tower costs. Clearwire, for example, claims that its cell tower costs using 2.5 GHz spectrum are nearly half that of other cell providers. See Clearwire Investor Presentation, Feb. 10, 2010, slide 10, available at <http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9Mjc4NDc1OHxDaGlzZEIEPTM3MTE4MXxUeXB IPTI=&t=1>.

refuted by real world facts. Providers with all types of spectrum are continuing to make extremely large investments to develop, deploy, upgrade, and expand their networks. Clearwire, for example, is rapidly deploying a nationwide wireless broadband network using its immense holdings of 2.5 GHz spectrum.⁷⁴ Clearwire has touted that it has a “spectrum advantage”⁷⁵ and Clearwire’s partner, Sprint, recently bragged that it had enough spectrum to deploy both a successful nationwide WiMax network *and* a nationwide LTE network.⁷⁶ Similarly, MSS provider Harbinger/Skyterra, which uses spectrum above 1 GHz, has committed to deploying a nationwide MSS-based mobile wireless network within the next few years.⁷⁷ In addition, a lack of sub 1 GHz spectrum has not hampered T-Mobile’s from upgrading and expanding its network to HSPA+, which it claims “now offers 4G speeds to more people than any other wireless network in the country”⁷⁸ Nor has a lack of sub 1 GHz spectrum impeded the rapid entry and expansion of smaller providers, like MetroPCS and Leap, which are the *Fourteenth Report* recognizes are the fastest growing providers in the U.S.⁷⁹

Finally, the assertions in the *Fourteenth Report* that the U.K. and Germany placed limits on the amount of sub-1 GHz spectrum that incumbent in those countries could purchase are

⁷⁴ Clearwire’s 2.5 GHz spectrum holdings significantly exceed the spectrum holdings of either AT&T or Verizon. *See, e.g., Fourteenth Report* ¶ 268, Chart 40.

⁷⁵ *See* Clearwire Investor Presentation, Feb. 10, 2010, slide 12, *available at* <http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9Mjc4NDc1OHxDaGlsZEIEPTM3MTE4MXxUeXB IPTI=&t=1>.

⁷⁶ *See* Communications Daily, July 16, 2010 (Sprint CEO Dan Hesse tells Financial Times “[w]e have the spectrum resources where we could add LTE if we choose to do that, on top of the WiMAX network . . . that is the beauty of having a lot of spectrum is that we have a lot of flexibility”).

⁷⁷ *Harbinger/Skyterra Merger Order* ¶ 56.

⁷⁸ T-Mobile Press Release, T-Mobile HSPA+ Network Now Delivers Broadest Reach Of 4G Speeds In U.S. (July 21, 2010), *available at* <http://press.t-mobile.com/articles/t-mobile-HSPA-4G>.

⁷⁹ *Fourteenth Report* ¶ 175.

irrelevant and only confirm the folly of such “caps.” The U.K. has since *abandoned* those proposed restraints on the grounds that they are not needed to promote broadband competition.⁸⁰

In Germany, the plan did not work. The auction “fizzled out after more than a month of incremental bidding” with only the four incumbents bidding.⁸¹

II. MARKET PERFORMANCE METRICS CONFIRM THAT THE WIRELESS MARKETPLACE IS HIGHLY COMPETITIVE.

As the Commission has explained “[t]he structural and behavioral characteristics of a competitive market are desirable not as an ends in themselves, but rather as a means of bringing tangible benefits to consumers,”⁸² and “consumer outcomes are the ultimate test of effective competition.”⁸³ Accordingly, the Commission has always examined traditional market performance issues, including trends in pricing, penetration, output, investment, innovation, and quality of service. Again, these metrics overwhelmingly show continued improvements over the *Thirteenth Report* when the Commission last found the wireless marketplace to be effectively

⁸⁰ See, e.g., David Meyer, Government sets out 4G spectrum auction plans, ZDnet UK (July 28, 2010), available at <http://www.zdnet.co.uk/news/mobile-working/2010/07/28/government-sets-out-4g-spectrum-auction-plans-40089674> (“The [U.K.] coalition’s SI [Statutory Instrument] is very close to that laid down by the Labour government in March, with notable differences being the lack of a government-mandated cap on spectrum holdings”); Explanatory Memorandum To The Wireless Telegraphy Act 2006 (Directions To Ofcom), Order 2010, 2010 No. Draft, Summary: Analysis and Evidence, at 6, available at http://www.opsi.gov.uk/si/si2010/draft/em/ukdsiem_9780111500767_en.pdf (“In contrast to previous solutions considered by the UK Government, at the present time, Ofcom would not be directed to introduce quantitative restrictions on holdings of particular frequencies (so-called ‘spectrum caps’”). As explained in the Explanatory Memorandum that accompanied the elimination of spectrum caps, technology trends and broadband demand “reduce[d] [the] competition concerns” on which the original caps were based.” *Id.* at 11.

⁸¹ Michael Newlands, Big three operators happy with low-cost German auction, Policy Tracker (May, 26, 2010), available at <http://www.policytracker.com/search?Subject:list=Wireless%20broadband&Type=News%20Item>.

⁸² *Fourteenth Report* ¶ 153.

⁸³ *Thirteenth Report* ¶ 187.

competitive. Output is up dramatically, prices continue to decline, penetration has reached over 90% and is high among all demographics, investment continues to be extremely high (which is particularly extraordinary given the recent economic recession), innovation continues at breakneck speed, and quality of service is at record levels.

Indeed, the U.S. leads the rest of the world in every metric. U.S. customers have more choices than customers in other countries,⁸⁴ and U.S. customers use more voice minutes and more data than do those in any other country.⁸⁵ And, U.S. customers also pay lower prices than customers in other countries.⁸⁶ In addition, U.S. providers are leading the world in the wireless broadband revolution. The U.S. “ranks 1st in world 3G subscribers,” and it “led the world in 3G net adds in 2009.”⁸⁷ “While the U.S. accounts for only 6% of the total world’s total wireless subscribers, the U.S. has more than 21% of the worlds 3G subscribers.”⁸⁸ U.S. customers

⁸⁴ CTIA May 2010 Wireless Market Statistics, slide 6 (“Of the 26 OECD countries tracked, 12 have three or fewer competitors, 12 have four, and only the U.S. and Canada have more than five”); *Fourteenth Report*, Table 5 (showing that nearly three quarters of the U.S. population can choose among 5 or more competitors).

⁸⁵ *Fourteenth Report*, Table 40 (showing U.S. with average voice minutes of 829, nearly double that of the next closest country, Hong Kong at 447 average minutes); *see also id.* ¶ 362 (“U.S. mobile subscribers talked an average of 829 minutes per month on their mobile phones in the fourth quarter of 2008. This compares with 139 MOUs in Japan and an average across Western Europe of 158 MOUs, with estimated MOUs in individual European countries ranging from a low of 102 in Germany to a high of 246 in France.”); *see also* CTIA Wireless Facts, available at http://files.ctia.org/pdf/051710_-_Independent_Assessment_of_Wireless_Industry.pdf (“The U.S. has the highest MOUs per month per user and the lowest average revenue per minute of service out of the 26 OECD countries tracked by Bank of America Merrill Lynch” and “[t]he U.S. has the largest mobile data market and the most mobile Internet users than any other country”).

⁸⁶ *Fourteenth Report*, Table 40 (1994-2008 prices); Comments of CTIA, *Framework for Broadband Internet Service*, GN Docket No. 10-127, at 20 (filed July 15, 2010) (“CTIA Broadband Framework Comments”) (2009 prices).

⁸⁷ Chris Pearson, *The Mobile Broadband Evolution, The Changing World of Wireless*, at 4, 3G Americans.

⁸⁸ CTIA May 2010 Wireless Market Statistics, at 9.

purchase more than two times as many smartphones as the next closest country (China),⁸⁹ and U.S. customers are typically the first to have access to the latest technology.⁹⁰ Cutting edge devices are typically made available first in the U.S., and the U.S. is leading the world in deployment of next generation LTE services, as well as other types of mobile wireless broadband services, including WiMAX and MSS-based services.⁹¹ These remarkable successes are the direct result of intense rivalry among U.S. wireless providers.

The *Fourteenth Report* de-emphasizes these consumer-focused facts and places greater weight on newly devised metrics apparently designed to avoid the conclusion that the wireless marketplace is effectively competitive. But, as discussed below, even the Commission recognizes that these new metrics – such as accounting profits – are largely invalid and certainly irrelevant to the Commission’s intended clients, *i.e.*, customers.

1. *Output and Prices.* Despite extraordinarily high penetration levels (discussed below), the *Fourteenth Report* shows that subscribership continued to grow into 2009 for virtually all providers (with the exception of Sprint),⁹² voice usage continues to be strong (although consumers increasingly substitute text messaging, email, instant messaging, and VoIP),⁹³ text

⁸⁹ Chris Pearson, *The Mobile Broadband Evolution, The Changing World of Wireless*, at 4, 3G Americans.

⁹⁰ CTIA Broadband Framework Comments, at 11.

⁹¹ *Id.*, at 11 (“[A]lmost all of the ‘hottest’ and most innovative smartphones are first launched in the United States. These devices include the Apple iPhone, iPhone 3G, iPhone 3GS and iPhone 4; Apple iPad; Google G1, MyTouch and Nexus One; Blackberry Storm, Bold, Pearl, Tour and Curve 8900; Samsung Instinct; Palm Pre and Pixi; Amazon Kindle; Barnes & Noble Nook, and the EVO 4G from HTC.”); Chris Pearson, *The Mobile Broadband Evolution, The Changing World of Wireless*, at 4, 3G Americans (showing U.S. leading world in LTE deployment).

⁹² *Fourteenth Report*, Table 14 & ¶ 171. The report shows overall subscriber growth of 2.9 percent for the first quarter of 2009, which is lower than historical growth. *Id.*, Chart 19. But that is most likely attributable to the already high penetration rate (90%) and the impact of the economic downturn and corresponding decreased consumer spend on all goods and services.

⁹³ *Id.* ¶ 176 (citing data submitted by CTIA).

messaging continues to increase by hundreds of billions every six months,⁹⁴ and broadband data usage is increasing exponentially.⁹⁵ Moreover, output is high across all demographics and types of service plans.⁹⁶ The Comments of CTIA that will be filed in this proceeding show that these trends continued into 2010.

At the same time, prices are lower – already almost the lowest in the world – continue to decline. According to the *Fourteenth Report*, the per minute price of voice services fell from \$0.41 cents in 1994 to about a nickel. More recent data from CTIA shows that it continued to fall in 2009 to \$0.04.⁹⁷ Prices for text messaging fell by more than *half* in 2008 (\$0.011) compared to 2007 (\$0.025).⁹⁸ And monthly broadband prices have remained constant or have declined, even as consumers continue to use exponentially *more* data services every month, resulting in significant per unit declines in prices.⁹⁹ Not surprisingly, the consumer price index for wireless shows decreasing prices, while overall consumer prices have been increasing.¹⁰⁰

⁹⁴ *Id.* ¶ 178-180 (citing data submitted by CTIA).

⁹⁵ *Id.* ¶¶ 181-184; *See also* Cisco White Paper, Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2009-2014 (Feb. 9, 2010) (predicting exponential growth in data traffic from 2009 through 2014); *AT&T Tees Up the 3G Mobile Broadband Network in the Greenbrier and Lewisburg*, CNNMoney.com (July 26, 2010), available at <http://money.cnn.com/news/newsfeeds/articles/prnewswire/CG40353.htm> (“Wireless data traffic on the AT&T network grew more than 5,000 percent from 2007 to 2009, largely attributed to the increasing popularity of advanced smartphones and the performance of AT&T’s 3G network, the nation’s fastest.”); Jennifer Johnson, *Droid X Users Consume 5X More Data*, Hothardware (July 22, 2010) (quoting Verizon as stating that “Droid X owners . . . use five times the amount of data [compared to] other smartphone owners”), available at <http://hothardware.com/News/Droid-X-Users-Consume-5X-More-Data/>.

⁹⁶ *Fourteenth Report* ¶ 163-64.

⁹⁷ *Fourteenth Report*, Table 19 (showing 1993 to 2008 per minute voice prices); CTIA Broadband Framework Comments, at 20 (showing 2009 per minute voice prices).

⁹⁸ *Fourteenth Report*, Table 20 (citing CTIA data and Commission estimates).

⁹⁹ As discussed in Part II.A, below, prices for broadband plans have remained steady or decreased. At the same time, as noted above, broadband usage is growing exponentially.

¹⁰⁰ *Id.* ¶ 186 (“From 2007 to 2008, annual Cellular CPI decreased . . . while the overall CPI

Although these developments should be cause for celebration, the *Fourteenth Report* puts as dour a face on them as it can. Remarkably, the Commission begins by discussing total revenues per voice minute (“RPM”), and bemoans that this metric rose for the first time since 1994, by nine percent, to \$0.07. Although RPM may have been a useful proxy for per unit voice prices years ago when voice services were virtually the only wireless services offered, it is obviously of little, if any, value today, given the explosion of data and messaging services, which account for a large and increasing proportion of overall revenues. It is no wonder the Commission all but concedes, as it must, that RPM has become completely irrelevant as a measure of per-minute voice prices.¹⁰¹ The only relevant measure – *voice* revenues per voice minute – were in 2008 at a record low (\$0.05), and continued to decline in 2009 to \$0.04. That is the lowest among 26 OECD countries followed by Bank America Merrill Lynch.¹⁰²

The *Fourteenth Report* also refuses to take a position on broadband pricing – perhaps because the news unquestionably would be good. The Commission claims that it lacks the data to make any determinations about pricing trends.¹⁰³ But, as noted, elsewhere in the *Fourteenth Report* the Commission shows that wireless broadband data usage has been increasing exponentially as pricing plans remain constant or are falling. Simple mathematics is all that is needed to understand that this cannot have happened unless there have been dramatic declines in per-unit prices, however one defines the units. Thus, it is puzzling why the Commission fails to

increased. . . . The Cellular CPI has declined by 35.8 percent since December 1997”).

¹⁰¹ *Id.* ¶ 189 (“As the contribution of data services to total revenues has increased, RPM has become an increasingly inaccurate measure of the pricing of mobile voice service”). This, of course, is an understatement. Not only is RPM inaccurate, it is biased because it is inaccurate in only one direction – upward.

¹⁰² *Id.* Table 40 (2008 per minute voice prices); CTIA Broadband Framework Comments, at 20 (2009 per minute voice prices).

¹⁰³ *Fourteenth Report* ¶ 193.

note this clear fact.

2. *Penetration and Net Adds.* The national and regional penetration rates presented in the *Fourteenth Report* are also remarkable. Overall penetration rates as of year-end 2008 were over 90%,¹⁰⁴ and “[i]n 53 of the 160 EAs, the penetration rates exceeded 90 percent, up from 24 EAs at the end of 2007,” while “[o]nly two EAs, with a combined population of just 415,000, had penetration rates under 70 percent.”¹⁰⁵ In addition, “[s]everal EAs . . . had penetration rates exceeding 100 percent, which is likely due to subscribers having more than one device.”¹⁰⁶ The report further confirms that penetration is high among all age groups (*e.g.* 89 percent for ages 65 and over up to 96 percent for ages 18-24).¹⁰⁷ As shown in the CTIA comments filed in this proceeding, penetration rates increased even further for 2009. And, providers continue to rapidly upgrade and expand their networks. In July 2010 alone, AT&T upgraded and expanded its network in several areas, including rural areas.¹⁰⁸

Here again, however, the Commission focuses on data that does not tell the true story, namely broadband subscribership data from Form 477. That data shows that, as of 2008, there

¹⁰⁴ *Id.* ¶ 156.

¹⁰⁵ *Id.* ¶ 170.

¹⁰⁶ *Id.*

¹⁰⁷ *Id.* Chart 17.

¹⁰⁸ *See, e.g.*, AT&T Press Release, AT&T Brings 3G Mobile Broadband Network to del Rio (July, 23, 2010), *available at* <http://www.att.com/gen/press-room?pid=18169&cdvn=news&newsarticleid=30988&mapcode=Wireless>; AT&T Press Release, AT&T Brings 3G Mobile Broadband Network to Hunt County (July, 21, 2010), *available at* <http://www.att.com/gen/press-room?pid=18143&cdvn=news&newsarticleid=30972&mapcode=Wireless>; AT&T Brings 3G Mobile Broadband Network to Sulphur Springs (July, 15, 2010), *available at* <http://www.att.com/gen/press-room?pid=18124&cdvn=news&newsarticleid=30955&mapcode=Wireless>; AT&T Brings 3G Mobile Broadband Network to Terre Haute, Indiana (July, 1, 2010), *available at* AT&T Brings 3G Mobile Broadband Network to Terre Haute, Indiana.

were 25 million Americans that subscribed to a wireless broadband plan.¹⁰⁹ But even the Commission acknowledges that this figure is much higher now. Indeed, the *Fourteenth Report* reveals elsewhere (¶ 162) that “mobile wireless data penetration rates . . . were 180 million mobile data subscribers in 2009, which translates into a penetration rate of 63%.” This rapid acceleration is itself significant – far more so than one would glean from the *Fourteenth Report* – but the *Fourteenth Report* understates the number of users in 2008, because it does not count customers that have broadband capable devices and use broadband services on a pay-as-you-go basis. In that regard, the Form 477 data indicate that 86 million customers in 2008 had a broadband capable device,¹¹⁰ the vast majority of which almost certainly use broadband services.

3. *Investment.* Investment by wireless providers is another success story. In 2009, U.S. wireless providers invested more than wireless providers in the five largest European countries combined.¹¹¹ But, once again, the Commission puts a negative spin on positive data. It ignores research and development and focuses solely on capital expenditures (*e.g.*, network upgrades and expansion), and it claims that, by some crabbed measures, capital expenditures have been decreasing.¹¹² These claims are misleading and, in any event, miss the point.

First, the data in the *Fourteenth Report* clearly show that capital expenditures have remained remarkably strong in the wireless industry, notwithstanding the severe recession and despite the fact that investment in other industries has fallen. AT&T, T-Mobile, and Verizon all *increased* their capital expenditures from 2007 through 2009, and the *Fourteenth Report* fails to

¹⁰⁹ *Id.* Chart 10. These data are new and, as the Commission points out, are not “directly comparable to mobile wireless high speed connections reported for earlier dates.” *Id.* ¶ 158.

¹¹⁰ *Id.* ¶ 158.

¹¹¹ CTIA May 2010 Wireless Market Statistics, at 8 (“In 2009, U.S. wireless providers invested \$20.4 billion in their currently operational networks alone, compared to \$17.9 billion invested by wireless providers in the five largest European countries.”).

¹¹² *Fourteenth Report* ¶¶ 210-13.

mention that both Leap Wireless and MetroPCS also significantly increased capital expenditures between 2007 and 2009 by 39% (Leap) and 8% (MetroPCS), or that Clearwire increased its capital expenditures over that time period by 223%.¹¹³ Of course, even if that were not the case, there is no reason to expect capital expenditures to increase by the same amount year after year. Capital expenditures tend to be “lumpy.” Providers make significant expenditures to upgrade and expand their networks in one year (*e.g.*, perhaps because a new generation of technology has just been introduced), and then focus the next year on signing up customers and integrating those new facilities into their existing networks, and then make additional capital expenditures later, and so on. Minor variations from year to year thus should not be surprising, much less an indication of declining competition.

In any event, the data show that the decrease in overall capital expenditures may be attributable to a single provider – Sprint. Buried at the very end of the “investment” section, Chart 33 shows that capital expenditures have consistently increased since 2006 for AT&T, Verizon and T-Mobile. Sprint is the only provider that, according to the data in the *Fourteenth Report*, has reduced capital expenditures since 2006. As AT&T has previously noted, Sprint, for reasons of its own, has chosen not to invest in its own network and is instead reselling services provided by Clearwire – but the company-specific actions by Sprint provide no reason to question the overall industry’s commitment to compete on the basis of upgraded networks.

The *Fourteenth Report* also misinterprets the CTIA data on which it relies. It states that the “data from CTIA suggests that . . . capital investment has been declining over the past four

¹¹³ See Leap Wireless 2009 and 2008 Annual 10Ks, available at <http://phx.corporate-ir.net/phoenix.zhtml?c=95536&p=quarterlyearnings>; MetroPCS 2009 and 2008 Annual 10Ks, available at <http://investor.metropcs.com/phoenix.zhtml?c=177745&p=quarterlyearnings>; Clearwire 2009 and 2008 Annual 10Ks, available at [http://investors.clearwire.com/phoenix.zhtml?c=198722&p=irol-newsArticle&ID=1263229&highlight=.](http://investors.clearwire.com/phoenix.zhtml?c=198722&p=irol-newsArticle&ID=1263229&highlight=)

years,”¹¹⁴ but as CTIA explains, that is not so. The data that CTIA collects and reports include only those expenditures on items that were put into service in that given year. Thus, for example, such data do not reflect the billions of dollars of investments made by providers to upgrade to LTE and other not-yet-activated upgrades and expansions. It also does not include the more than \$33 billion in capital expenditures that providers made to purchase spectrum in the last two auctions.¹¹⁵ Even with these limitations, as CTIA explains in its comments, incremental capital expenditures for 2009 were higher than in 2008.

4. *Service Quality.* The *Fourteenth Report* shows that quality of service is at record high levels, with the number of dropped calls at record low levels.¹¹⁶ Moreover, it shows that competition has driven providers to make investments to improve service quality such that all providers are now near parity in terms of service quality.¹¹⁷ A recent Commission survey found that 92 percent of customers were satisfied with their mobile wireless service.¹¹⁸ AT&T has been a leader on this front even though it has experienced far greater growth in data services than any other provider. For example, a recent report by the Yankee Group found that 73% of AT&T’s iPhone users are “very satisfied” with AT&T’s network, whereas only 69% of all smartphone customers say they are “very satisfied” with their mobile networks.¹¹⁹

¹¹⁴ *Fourteenth Report* ¶ 210.

¹¹⁵ CTIA Broadband Framework Comments, at 21, n.46.

¹¹⁶ *Fourteenth Report* ¶¶ 222-223.

¹¹⁷ *Id.* ¶ 223.

¹¹⁸ John Horrigan, Ellen Satterwhite, FCC Survey, *Americans’ perspectives on online connection speeds for home and mobile devices*, at 1, available at http://www.fcc.gov/Daily_Releases/Daily_Business/2010/db0601/DOC-298516A1.pdf.

¹¹⁹ David Goldman, *Most iPhone users love AT&T*, CNN Money.com (July 23, 2010), available at http://money.cnn.com/2010/07/23/technology/iphone_4_att/index.htm?source=cnn_bin&hpt=Sbin.

Numerous objective analyses confirm these high consumer satisfaction levels. “The America Customer Satisfaction Index reported that their Overall Business Quality Index from 2004 through 2010 increased only 2% while the wireless industry improved 10.8% in that same span. In 2010, the wireless industry set an all time high in this index for the second straight year. According to JD Power, network quality, retail sales and customer service have all improved year-over-year from 2009 to 2010. The Better Business Bureau reports that, since 2004, the monthly complaint rate for the wireless industry has fallen 22%. And the number of FCC complaints related to marketing, advertising, contracts, early termination fees, network quality, billing, and rates was significantly lower in 2009 than they were in 2008, even as subscribership increased.”¹²⁰ The number of complaints for the first three quarters of 2009 on non-Telephone Consumer Protection Act related issues was down almost 9 percent from the same period in 2008 – there is less than one such complaint per day for every *five million* customers.¹²¹

5. “*Profitability.*” This year, the Commission for the first time presents (§§ 215-224) various measures of wireless industry accounting profits. The Commission acknowledges, however, that accounting profits have extremely limited value because they differ in many respects from any “true measure of economic profit.”¹²² Accordingly, the Commission explains that it is not drawing any conclusions from the absolute level of its accounting profit metrics, but

¹²⁰ AT&T Public Policy Blog, “The U.S. Wireless Industry – It’s All About the Consumer,” July 27, 2010, available at <http://attpublicpolicy.com/government-policy/the-u-s-wireless-industry-%E2%80%93-it%E2%80%99s-all-about-the-consumer/>.

¹²¹ CTIA Wireless Facts, at 1, available at http://files.ctia.org/pdf/051710_-_Independent_Assessment_of_Wireless_Industry.pdf. Telephone Consumer Protection Act issues are related to calls from telemarketers and not typically caused by the underlying service provider.

¹²² *Fourteenth Report* ¶ 215.

explains that these metrics may be useful for “compar[ing] the performance of mobile wireless segments of different communication[s] providers.”¹²³ The accounting metrics used by the Commission, however, are not useful for even that limited purpose.

The Commission begins its presentation by discussing the problems with using EBIT – earnings before interest and taxes – for anything. The Commission explains, for example, that “as interest payments on debt and corporate income taxes are generally recurrent cash flow obligations, some experts argue that these measures may not always be good estimates of operating cash flow” and that “[f]ederal and [s]tate[] income taxes can be over one-third of pre-tax income and they are deducted [from] most profit formulas.”¹²⁴ Thus, because EBIT does not account for these significant expenditures that vary widely among firms, EBIT metrics cannot produce apples to apples comparisons among firms, and the Commission explains that “[w]e do not discuss EBIT data in this *Report*.”¹²⁵

But the EBITDA metrics – earnings before interest, taxes, depreciation, and amortization – the *Fourteenth Report* uses has all of the same flaws as EBIT. In addition, EBITDA has even more severe problems. As the *Fourteenth Report* explains, depreciation and amortization – the two additional amounts that are left out of the EBITDA metric – are two of the largest costs in highly capital intensive industries like the wireless industry. Depreciation relates to assets such as the tens of thousands of cell towers deployed throughout the country, and amortization reflects annual payments on long term investments, including capital expenditures, which the Commission recognizes are extremely high in the wireless industry.

Consequently, comparing firms within an industry using EBITDA can be valid only if

¹²³ *Id.*

¹²⁴ *Id.* ¶ 216.

¹²⁵ *Id.*

one assumes that all firms have made similar capital expenditures (which are paid for via depreciation and amortization), so that omitting depreciation and amortization from the profits metric makes no difference. The *Fourteenth Report* itself concedes this point: “EBITDA can be a useful measure of [profits]” only “[t]o the extent that capital expenditures are proportionately similar across firms and over time.”¹²⁶ But the *Fourteenth Report* then goes on to use EBITDA without acknowledging that different wireless providers have indeed incurred different capital expenditures that are proportionately quite different, as it showed elsewhere in its report.¹²⁷ Indeed, the *Fourteenth Report* recognizes that AT&T and Verizon have recently made capital expenditures that far exceed that of Sprint (which has declining capital expenditures) or T-Mobile, and thus it should not be surprising that AT&T and Verizon have higher EBITDAs (which reflect only the earnings from those capital expenditures and ignore the costs of these expenditures) than Sprint or T-Mobile. For these reasons, the *Fourteenth Report’s* comparisons of EBITDA per Subscriber and EBITDA Margins (*i.e.*, EBITDA divided by revenue) are meaningless, because they do not account for the significant differences in interest, taxes, depreciation and amortization among the firms.¹²⁸

¹²⁶ *Id.* ¶ 217.

¹²⁷ The *Fourteenth Report* itself documents (¶ 213 & Chart 33), for example, that as Clearwire, AT&T, Verizon and others are increasing their capital expenditures, Sprint is reducing its expenditures, and that (¶ 219) that there can be significant differences among providers that may reflect “underlying factors including different characteristics of service and product offerings, different customer preferences, different network designs and capabilities, different cost structures, [and] scale economies.”

¹²⁸ In addition, “[t]he differences in EBITDA per subscriber across providers may reflect many underlying factors including different characteristics of service and product offerings, different customer preferences, different network designs and capabilities, different cost structures, scale economies, and the degree of competitive rivalry. The changes in EBITDA per subscriber for individual providers can also reflect changes particular to the provider; for example, acquisitions of networks in mergers or changes in service and product offerings over time. It is possible that some of the correlated changes across providers reflect macroeconomic effects on demand.” *Fourteenth Report* ¶ 219.

The *Fourteenth Report* computes EBITDA minus CAPEX per subscriber in an attempt to capture the impact of the vastly different capital expenditures made by the different providers. But this adjustment is insufficient. It still omits interest, taxes and depreciation, all of which the *Fourteenth Report* notes can be significantly different among firms. The *Fourteenth Report* further admits that “EBITDA minus CAPEX does not account for purchases of spectrum licenses, a significant expense of mobile wireless providers,” which has also varied greatly among wireless providers.¹²⁹

More importantly, the EBITDA minus CAPEX metric does not properly capture each firm’s capital expenditures. The *Fourteenth Report* appears to have simply computed each provider’s annual EBITDA and then subtracted each provider’s capital expenditures for that year. But this calculation fails to capture the fact that capital expenditures are “lumpy” long term investments – providers may make large capital expenditures in one year and then make much lower ones in subsequent years, while others have the opposite pattern. Furthermore, because *today’s* Depreciation & Amortization pays for *yesterday’s* capital expenditures, there is no reason to expect that the current CAPEX being subtracted is in any particular proportion to the current Depreciation & Amortization being ignored.

For example, Chart 34 shows that in 2007 AT&T had the second highest EBITDA among the firms in the comparison, but Chart 35 shows that in 2006 AT&T had the *lowest* EBITDA minus CAPEX. That merely shows that AT&T happened to have extraordinarily high levels of capital expenditures in 2006 (as shown elsewhere in the report (Chart 33)). When AT&T later reduced its capital expenditures in 2007, its EBITDA minus CAPEX rose to the highest, and then in 2008 when it increased CAPEX again, it declined to second place. These data thus reflect

¹²⁹ *Fourteenth Report* ¶ 218.

only AT&T's lumpy CAPEX over the past few years, not that it was more or less "profitable" than other providers during those years.

Finally, the arbitrariness of the EBITDA, EBITDA minus CAPEX, and EBITDA margin metrics is further illustrated by comparing these statistics for AT&T and Verizon, both of which likely had the most similar capital expenditures over the past few years. In each case, the metric for Verizon significantly exceeds that for AT&T. This may be due to many factors, including for example that portions of Verizon Wireless' earnings and investment costs may be owed or paid by its equity partner, Vodafone, and thus reflected differently in Verizon's EBITDA-based metrics. Examining other industries likewise confirms the arbitrariness of the metrics. For example, in the first quarter of 2010, Ford had an EBIT margin that was more than *double* that of GM, but no reasonable analyst would rely on such a statistic to suggest that Ford has market power or that the automobile industry is not competitive.¹³⁰

6. *ARPU Metrics.* Finally, the *Fourteenth Report* raises questions about changes in "ARPU" – the average revenue received by a provider per customer.¹³¹ ARPU data can be a useful metric when properly examined in context. But if a growing proportion of a provider's customers are purchasing messaging and broadband services in addition to their voice services, ARPU may increase because each customer is now purchasing more services from the provider, even if the per unit prices of voice, messaging and broadband services have all declined.¹³²

¹³⁰ Joann Muller, *GM And Ford Take Different Paths To Profit*, Forbes.com (May 18, 2010), available at <http://www.forbes.com/2010/05/17/ford-general-motors-chrysler-business-auto-gm.html>. (Ford's "operating margin was twice GM's EBIT margin, putting it among the industry's best performers.").

¹³¹ *Fourteenth Report* ¶¶ 202-204.

¹³² As a matter of basic mathematics, ARPU will increase as more users purchase a product. For example, if a provider has 10 customers and 4 of them purchase a \$30 data plan (totaling \$120), then the ARPU would be \$12 (\$120 divided by ten customers). If, in the next year, 8 customers purchase a \$25 data plan, ARPU will rise to \$20, even though the price of the data plan has

Here, the *Fourteenth Report* shows that, according to CTIA data, wireless ARPU declined by about \$2.59 from 2004 to 2007 and remained essentially flat from 2007 to 2008.¹³³ Updated data from CTIA shows that wireless ARPU dropped precipitously from 2008 to 2009 by nearly \$2.¹³⁴ Yet, as shown above, customers continue to purchase more voice, messaging and broadband services than ever before. As a matter of basic mathematics, increased adoption and use can produce declining ARPUs only if prices for voice, messaging, and broadband are falling significantly faster.¹³⁵ The ARPU metric thus once again confirms that competition in the wireless marketplace is providing customers with far more services for the same or lower prices.

III. PROVIDER AND CUSTOMER CONDUCT FURTHER CONFIRMS THAT THE WIRELESS MARKETPLACE IS INTENSELY COMPETITIVE.

The *Fourteenth Report* confirms that providers and consumers are behaving in a manner that can only be consistent with intense competition. As discussed below, providers are constantly battling to provide the most desirable bundles of service with the best combination of price, features, coverage, speed, and quality. Providers also continue to make extraordinary investments to upgrade and expand their networks and to develop innovative technologies and service offerings. Consumers are better informed than ever about their alternatives, and they

fallen by \$10.

¹³³ *Id.* Chart 29.

¹³⁴ CTIA Broadband Framework Comments, at 18 (“As of the end of 2009, the average wireless consumer’s bill was \$48.16, in spite of explosive growth in other provided services included as part of the bill such as Internet access, SMS texting, MMS and other new services.”).

¹³⁵ Consider the case of a provider with a single customer. If the customer originally purchased only a voice plan, and then later added a messaging plan and broadband plan, that customer’s bill (ARPU) will remain the same or decline only if the combined voice, messaging and broadband plans are priced at the same level as the customer’s original voice plan, which means that the prices for each individual component of the service must be lower. Similarly, if the customer originally purchased a voice, messaging and broadband plan, but then substantially increase the use of those services while paying the same amount, then the per unit price for those services must have declined.

readily vote with their feet when they believe another provider will offer them better value.

A. Provider Conduct Confirms That the Wireless Marketplace Is Highly Competitive.

When examining provider conduct to assess the competitiveness of a marketplace, the Commission assesses the extent to which providers react to price and non-price changes in the offerings of other providers, the extent to which they are investing and innovating to keep up with or surpass their rivals, and the extent to which they are investing in advertising and employing other methods of winning customers from their competitors. In the *Fourteenth Report*, the Commission examined both price rivalry and non-price rivalry, the latter of which includes network investments, advertising and retailing, and handset/application offerings. By these metrics, the provider conduct data presented in *Fourteenth Report* – as well as subsequent data – overwhelmingly establishes that the wireless marketplace is highly competitive.

1. Price Rivalry Is Intense In The Wireless Industry.

As shown in Part II, above, wireless providers are continuing to provide more, better and faster services at lower prices. The *Fourteenth Report* separately addressed pricing rivalry for postpaid services and prepaid services and found substantial evidence of intense rivalry.

First, the *Fourteenth Report* details how providers compete by seeking to “further differentiate[] their service plans by attaching additional features to existing plans, without changing core components such as the monthly recurring charge” to give consumers “more value for their money.”¹³⁶ For example, the report notes AT&T’s new bundles that include the “A-List” calling feature that allows customers to designate a list of domestic telephone numbers – mobile or landline – on any network that the customer will be able to call without using any of his minutes allowance. It also discusses the similar innovative offerings from Verizon, Sprint,

¹³⁶ *Fourteenth Report* ¶ 90.

and T-Mobile.¹³⁷ In addition, although AT&T has had a “bring your own phone” option for years, the report explains that in the year studied Verizon and T-Mobile began offering such options as well.¹³⁸

More generally, however, the *Fourteenth Report* shows that wireless providers are constantly offering customers better handsets and devices, more applications, broader coverage, faster speeds, improved reliability, and better customer service, all at the same or lower prices.¹³⁹ In that regard, the *Fourteenth Report* documents wireless competitors’ pricing rivalries. The report shows, for example, that T-Mobile introduced significant reductions to its unlimited voice and data plans during this period, and that AT&T and Verizon both responded shortly thereafter with their own “significant” “price cuts.”¹⁴⁰ The report documents similar aggressive pricing competition for prepaid services. It explains, for example, that providers initially offered only “European-style”¹⁴¹ limited-minute pay-as-you-go prepaid plans, but intense competition led to the introduction of unlimited prepaid plans. Prices for these plans subsequently plummeted: “[O]ne analyst estimated that [prices for] all-you-can-eat [prepaid] plans have dropped by as much as 55 percent since the first unlimited national flat-rate calling plan was launched by Verizon Wireless in . . . 2008.”¹⁴²

¹³⁷ *Id.*

¹³⁸ *Id.* ¶ 97. The *Fourteenth Report* also confirms that wireless roaming average revenues continue to fall. *Id.* Table 21. Indeed, although roaming minutes increased significantly from 2007 to 2008, total revenues were down. *Id.* The *Fourteenth Report* purports to be concerned that total roaming minutes have increased by less than overall minutes. *Id.* ¶ 197. But that merely confirms that providers are continuing to build out their networks and are thus increasingly relying on their own facilities rather than roaming arrangements.

¹³⁹ *Id.*

¹⁴⁰ *Id.* ¶ 92.

¹⁴¹ *Id.* ¶ 99.

¹⁴² *Id.* ¶ 102.

All of these facts are strongly indicative of effective competition. The *Fourteenth Report*, however, instead emphasizes that AT&T's and Verizon's prices for certain unlimited postpaid plans were slightly higher than those of Sprint and T-Mobile. But pricing competition does not mean identical prices. As the analysts cited in the *Fourteenth Report* correctly point out (§ 92), AT&T and Verizon offer premium services – broader coverage, higher speeds, and higher service quality – and they would therefore be expected to charge slightly higher prices. The more telling fact is that AT&T and Verizon are obviously reacting to price reductions by their rivals.

Moreover, the *Fourteenth Report* leaves out that AT&T has been a leader in cutting prices for other service plans. For example, AT&T's least expensive mass market individual voice plan is \$39.99 per month, and includes 450 Anytime minutes, a subsidized handset, 5000 Night and Weekend minutes, unlimited calls to other AT&T mobile handsets, and – unlike competing offers from T-Mobile and Sprint – Roll Over minutes. AT&T also offers seniors a \$29.99 plan that includes a subsidized handset, 200 monthly minutes, 1000 night and weekend minutes, and unlimited calls to other AT&T mobile handsets, neither of which T-Mobile or Sprint offer. And more recently (after the period covered by the *Fourteenth Report*), AT&T again led the industry by cutting prices for data plans – offering its iPhone and other smartphone users a \$15 plan for customers that use less than 250 megabytes of data each month and a \$25 plan for the 98 percent of its customers that use less than 2 Gigabytes of data.¹⁴³

2. Non-Price Rivalry.

The *Fourteenth Report* separately examines “non-price rivalry,” which is the extent to

¹⁴³ AT&T Press Release, *AT&T Announces New Lower-Priced Wireless Data Plans to Make Mobile Internet More Affordable to More People* (June 2, 2010), available at <http://www.att.com/gen/press-room?pid=17991&cdvn=news&newsarticleid=30854&mapcode=financial>.

which providers have invested in “(1) network upgrades; (2) product information and perception, which include[s] advertising and marketing; and (3) downstream product differentiation, including handset/device and application offerings.”¹⁴⁴ Again, these metrics show that the wireless marketplace is remarkably competitive.

Network Upgrades. The *Fourteenth Report* documents in detail the continued extraordinary investments in network upgrades made by wireless providers, and recent reports confirm that such investments and upgrades continue. The *Fourteenth Report* shows, for example, that “[i]n 2006, EV-DO networks covered 62.6 percent of the U.S. population” and that “[t]oday, they cover nearly all Americans,”¹⁴⁵ HSPA coverage increased from 20 percent coverage in 2006 to more than 76 percent coverage in 2009,¹⁴⁶ and “mobile WiMAX networks, which were effectively non-existent in the *Thirteenth Report*, now cover approximately 28 million people.”¹⁴⁷

Between the *Thirteenth* and *Fourteenth Reports*, Verizon added 44 million POPs to its 3G network, AT&T added 125 cities to its HSPA network with the HSPA 7.2 software upgrade, and T-Mobile expanded its HSPA coverage from 13 markets to 176 cities and began upgrading its HSPA network to HSPA+.¹⁴⁸ Similarly, “[a]s of September 2009, Clearwire’s WiMAX service was available in 14 markets covering 10.1 million POPs. Since that time, Clearwire has expanded the WiMAX network to an additional 16 markets and expects to reach 120 million

¹⁴⁴ *Fourteenth Report*, ¶ 104.

¹⁴⁵ *Id.* ¶ 123.

¹⁴⁶ *Id.*

¹⁴⁷ *Id.* ¶ 122.

¹⁴⁸ *Id.* ¶ 116.

POPs by the end of 2010.”¹⁴⁹ Regional operators also expanded and upgraded their broadband networks: for example, Leap Wireless increased its 3G coverage by 36 percent and U.S. Cellular increased its coverage from five markets to 75 percent of its customer base.¹⁵⁰

As the report notes, providers of all sizes are spending many additional billions of dollars to deploy next-generation broadband networks. As discussed above, AT&T, Verizon, and MetroPCS are all investing billions to upgrade their networks to next generation LTE technology; Cox is also in the process of testing its LTE network ahead of a planned deployment later next year; Clearwire continues to spend more than a billion dollars per year to increase the coverage of its WiMAX network; and satellite companies are spending billions of dollars to roll-out of a combined terrestrial (LTE) and satellite based broadband wireless service.

Moreover, providers continue to expand Wi-Fi networks throughout the U.S, and are experience explosive growth in the use of those networks. For example, “AT&T owns and operates the nation’s largest Wi-Fi network, with more than 20,000 U.S. hotspots at popular locations like retail stores, restaurants and coffee shops.”¹⁵¹ In the second quarter of 2010 “AT&T handled 68.1 million connections on its public Wi-Fi network – up from 15 million connections in the second quarter of 2009.”¹⁵² So far, AT&T customers “made 121.2 million connections in the first half of 2010, already far surpassing the 85.5 million connections made in all of 2009.”¹⁵³

¹⁴⁹ *Id.* ¶ 117.

¹⁵⁰ *Id.* ¶ 114.

¹⁵¹ Press Release, *Use of AT&T’s Wi-Fi Network Grows to More Than 68 Million Connections in the Second Quarter* (July 22, 2010), available at <http://www.att.com/gen/press-room?pid=18147&cdvn=news&newsarticleid=30973&mapcode=consumer>.

¹⁵² *Id.*

¹⁵³ *Id.*

Advertising and Retailing. The *Fourteenth Report* also demonstrates that non-price rivalry through advertising and marketing remains extraordinarily high. The Commission tries to paint this in a negative light by emphasizing that the more than \$3 billion that providers spent on advertising may have decreased slightly from 2007 to 2008, and the amount spent by AT&T and Verizon purportedly decreased slightly from 2007 to 2009.¹⁵⁴

This is a non-issue. The data to which the *Fourteenth Report* refers (¶ 128) show a decline in advertising from 2007 to 2008 from \$3.7 billion to \$3.4 billion. The fact that the wireless industry overall may have slightly reduced spending on advertising as the economy fell into a severe recession should not be terribly surprising or concerning. To the contrary, the surprising thing is how robust the wireless industry's advertising has remained during the recession: as the *Fourteenth Report* later admits, the wireless industry reduced its spending far less than other industries, and the wireless industry moved up from 7th to 4th place among the industries that spend the most on advertising. Moreover, in 2009 Verizon and AT&T were the 2nd and 3rd largest purchasers of advertising among all U.S. firms, and Sprint was 7th.¹⁵⁵

In any event, the use of 2007 as the starting point for its analysis skews the results because the 2007 advertising spend was abnormally high, due to several factors. First, the economy was still booming in 2007. Also, in 2007, AT&T dramatically increased its advertising expenditures because of the rebranding of Cingular Wireless as AT&T Wireless, as well as the initial roll-out of the first iPhone. Taking into account that 2007 presented unique circumstances, AT&T has significantly increased its advertising spend each year from 2006 through 2009 – as noted, in 2009, AT&T was the 3rd largest purchaser of advertising in the U.S. behind only

¹⁵⁴ *Id.* ¶ 128.

¹⁵⁵ CTIA Broadband Framework Comments, at 23 (providing data from TNS Media Intelligence).

Verizon (2nd) and Procter & Gamble (1st).¹⁵⁶

Equally important, in this instance a drop in absolute spending does not indicate a drop in advertising. As a result of the recession, advertising prices for 2008 and 2009 plummeted,¹⁵⁷ which means that even if the wireless industry spent slightly less in absolute dollars, they purchased *more* advertising overall.

Beyond advertising, the *Fourteenth Report* recognizes that investments in retail distribution of products and services provides further evidence of competition in the wireless marketplace. The *Fourteenth Report* summarizes the myriad distribution points for wireless services – the Internet, provider stores, handset manufacturer stores, Best Buy, Wal-Mart, Target, Costco, RadioShack, and many more. Relevant here, AT&T recently made very substantial additional investments to upgrade AT&T-branded retail outlets to provide customers with an even better experience.¹⁵⁸

Handsets and Applications. The *Fourteenth Report* recognizes that another indication of strong competition among providers is the extent to which they seek to differentiate their products by offering more desirable handsets, operating systems and applications.¹⁵⁹ Here, the statistics set forth in the *Fourteenth Report* speak for themselves. The report shows that there have been *sixty-seven* smartphones launched by more than *two dozen different* U.S. providers

¹⁵⁶ *Id.*

¹⁵⁷ See, e.g., Jeff Creps, *Advertising Prices Are Down, Time to Buy?*, SDNN (Dec. 14, 2009), available at <http://www.sdn.com/sandiego/2009-12-14/blog/sponsored-blogs/biz-soup/advertising-prices-are-down-time-to-buy> (“a JPMorgan study that looked at the price change of ads across all media in 2009. Of those that were polled in the study, at least 65% of respondents said that the cost of advertising in their desired media had gone down in 2009”).

¹⁵⁸ See, e.g., AT&T Press Release, *AT&T Completes Store Makeover in Time for Back-to-School Shopping* (July, 29, 2010), available at <http://www.att.com/gen/press-room?pid=18183&cdvn=news&newsarticleid=30995>.

¹⁵⁹ *Fourteenth Report* ¶ 135.

from March 2008 through January 2010, using a variety of operating systems.¹⁶⁰ And, as discussed above, there have been numerous additional new smartphones released since then, including the iPhone 4, HTC EVO 4G, Droid X, Droid Incredible, among others. By the third quarter of 2009, more than 44 percent of all handset sales were smartphones and 50 percent of all handset upgrades were smartphones (up from 27% and 29%, respectively in the second quarter of 2008).¹⁶¹

Innovative handsets, however, are only part of the story. Providers and manufacturers in the U.S. are vigorously competing for a piece of the emerging devices marketplace. This intense competition has spurred a flurry of e-readers, netbooks, GPS turn-by-turn devices, and digital picture frames, and this competition recently produced an entirely new category of wireless devices with the introduction of the iPad in the spring of 2010.¹⁶² And, with these innovative new devices comes more innovation in network and service offerings. AT&T, for one, has developed innovative technologies and service offerings to allow many of these devices (*e.g.*, Amazon Kindle) to come with seamless wireless connectivity out-of-the-box and customers are never required to interact with or directly pay AT&T. The iPad provides another example. With the introduction of the iPad, AT&T developed and deployed an innovative way for consumers to

¹⁶⁰ *Id.* App. C, Table C-5: Selected Smartphone Launches in 2008-2009.

¹⁶¹ *Id.* ¶ 137.

¹⁶² In July 2010, AT&T announced “that nearly 3.4 million connected devices have been added to the AT&T network in the past three quarters, including roughly 900,000 connected devices in the second quarter. The total number of connected devices on the AT&T network – both emerging consumer devices and machine-to-machine – is nearly 6.7 million.” *See, e.g., AT&T Press Release, AT&T Adds Nearly 900,000 Connected Devices to Network in 2Q; Now Services Nearly 6.7 Million Connected Devices (July 23, 2010), available at* <http://www.att.com/gen/press-room?pid=18149&cdvn=news&newsarticleid=30975>. Overall, “AT&T has certified more than 850 specialty consumer and machine-to-machine devices – such as eReaders, netbooks, digital photo frames, personal navigation devices, home security monitoring and smart grid devices – for use on its wireless network.” *Id.*

obtain data connectivity – iPad customers can choose from multiple data plans whenever they like, and they can change or cancel their data plan whenever they like. Moreover, providers continue to rapidly expand the already seemingly endless variety of applications across many handset platforms that hundreds of thousands of applications.

B. Customer Conduct Confirms That the Wireless Marketplace Is Highly Competitive.

Finally, consumer conduct further confirms that the wireless marketplace is effectively competitive. In the *Fourteenth Report*, the Commission considered two categories of data – consumer “switching costs” and churn¹⁶³ – and both sets of data demonstrate that consumers routinely vote with their feet and have the ability to choose the wireless option that best fits their needs.

As the Report documents, consumers have many sources of information about wireless services both from the providers themselves and from numerous third parties.¹⁶⁴ Many providers including AT&T also offer trial periods that permit customers to terminate a new wireless agreement within a certain number of days (AT&T’s policy is 30 days) without an ETF.¹⁶⁵ And, as explained above, consumer satisfaction is very high.¹⁶⁶

Churn rates also remained steady, with overall monthly churn rates in early 2009 increasing slightly to 2.1 percent.¹⁶⁷ These data dramatically confirm, again, that consumers frequently switch providers; indeed, as the Report explains, approximately one quarter of customers switch their service providers every year, and the average “subscriber lifetime” with

¹⁶³ *Fourteenth Report* ¶¶ 229-230.

¹⁶⁴ *Id.* ¶ 231.

¹⁶⁵ *Id.* ¶ 232.

¹⁶⁶ *Id.* ¶ 233.

¹⁶⁷ *Id.* ¶ 245 & Chart 38; Executive Summary, at 9.

any given provider is only about four years.¹⁶⁸ A 25 percent turnover every year is an obvious real-world demonstration that “switching costs” are minimal, although the Report states merely that these data “provide some indication that some customers are not locked in.”¹⁶⁹

The Executive Summary (but not the Report itself) emphasizes that “[c]hurn rates of the two largest national service providers are half the rates for the next two largest providers,”¹⁷⁰ but this is no cause for concern. The Report shows T-Mobile’s churn to be above 3% for the second quarter of 2009, but more recent data shows that T-Mobile had reduced churn to 2.2% as of the first quarter of 2010, a decrease of nearly 33 percent.¹⁷¹ The report also shows Sprint’s churn to be about 3% for the second quarter of 2009, but Sprint just reported a churn rate of 1.85% for the second quarter of 2010, also a nearly 33 percent improvement.¹⁷² Moreover, churn is a function of many factors and will naturally vary from company to company. AT&T and Verizon have for many years been investing billions of dollars in their networks, devices, applications stores, customer care procedures and advertising to maximize customer satisfaction and to reduce churn, and those investments clearly have paid off.¹⁷³ Moreover, different providers have different

¹⁶⁸ *Id.* ¶ 247-48.

¹⁶⁹ *Id.* ¶¶ 244-48.

¹⁷⁰ Executive Summary, at 9.

¹⁷¹ T-Mobile Release, *T-Mobile USA Reports First Quarter 2010 Results*, available at [http://www.t-mobile.com/Cms/Files/Published/0000BDF20016F5DD010312E2BDE4AE9B/5657114502E70FF301288DC2EF2B5271/file/TMUS2010PressRelease-FINALV1\[1\].pdf](http://www.t-mobile.com/Cms/Files/Published/0000BDF20016F5DD010312E2BDE4AE9B/5657114502E70FF301288DC2EF2B5271/file/TMUS2010PressRelease-FINALV1[1].pdf).

¹⁷² Sprint Press Release, *Sprint Nextel Reports Second Quarter 2010 Results* (July 28, 2010), available at <http://investors.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle&ID=1452819&highlight=>.

¹⁷³ *Cf.* Sprint Investment Analysis, [http://www.wikinest.com/stock/Sprint_Nextel_\(S\)](http://www.wikinest.com/stock/Sprint_Nextel_(S)) (“In the past couple of years, Sprint’s most pressing problem has been a high churn rate for post-paid subscribers. . . . This has stemmed from Sprint’s difficulties integrating its iDEN and CDMA networks, which disrupted Sprint’s once stellar customer service, as well as unlimited calling plans by competitors, which have rendered the iDEN network’s minute-saving ‘push-to-talk’

mixes of postpaid and prepaid customers, and as the Report itself explains (§ 246), providers will inevitably experience greater churn with prepaid customers than with postpaid customers.

The *Fourteenth Report* devotes most of its analysis to early termination fees (“ETFs”) as a possible “switching cost” (§§ 234-38), but the Report’s discussion of these fees fails to place them in their proper context. AT&T (and other providers) offer customers a variety of ways to buy devices and services. AT&T customers can pay full price for a device – either from AT&T or from a third party – and obtain month-to-month service from AT&T with no ETFs, or they can purchase a subsidized device from AT&T in return for making a term commitment subject to a prorated ETF. AT&T also offers prepaid service with “Pay as You Go” that requires no credit check, no contract and no ETF. With the “bring your own phone” option, a customer with a compatible device also can sign up for month to month postpaid service with no contract, no ETF and no device purchase.

AT&T customers clearly understand that they have choices – indeed, AT&T has millions of month to month and prepaid subscribers. To be sure, most AT&T customers choose the subsidized (with ETF) option, because it is an extremely good deal. It allows the customer to obtain an expensive cutting edge device at a very low up-front cost, in exchange for a one or two year contract with a pro-rated ETF (which is sometimes less than the subsidy given by AT&T).¹⁷⁴ As such this purchasing option has undoubtedly played a key role in the dramatic

capability obsolete. In the first half of FY2009, Sprint lost roughly 1.15M iDEN post-paid customers.”); Matt Ablott, *How do you solve a problem like T-Mobile USA?*, Mobile Business Briefing (May 26, 2010), available at <http://www.mobilebusinessbriefing.com/article/how-do-you-solve-a-problem-like-t-mobile-usa-> (“T-Mobile USA has long been playing catch-up on this front. It didn’t even begin rolling-out 3G until 2008, by which point its main rivals had already outlined their plans to move to so-called 4G technologies: LTE in the case of Verizon and AT&T, WiMAX at Sprint.”).

¹⁷⁴ See also *Fourteenth Report* § 236 (noting that providers had explained that “ETFs allow them to subsidize handset purchases – including purchases of smartphones – for customers; and that

expansion of wireless services in the United States with more than 270 million subscribers.

AT&T has previously explained the many benefits to both consumers and providers of giving consumers the option of purchasing handsets at discounted prices in return for a term commitment with an ETF: “First, for many consumers, the high retail cost of wireless equipment would make wireless service unaffordable. Second, wireless providers value the predictability of term commitments. This predictability helps providers plan and manage networks. Term commitments also provide a predictable revenue stream that helps fund capital investment. In the aggregate, term commitments also allow providers to reduce the price of service to all subscribers because they reduce providers’ acquisition and retention costs and increase the number of users on the network, allowing providers to reduce operating costs through economies of scale. ETFs make this bargain – bundled discounts in exchange for term commitments – more efficient by giving consumers an option to reduce their contractual obligations while providing providers with enough predictability to make it reasonable to discount device prices in exchange for a service commitment.”¹⁷⁵

Finally, the Commission notes (§ 233) that it is considering new regulations that would require providers to provide certain kinds of information or usage alerts, and the press releases accompanying the Report pointedly note that the Commission is considering regulations to combat “bill shock.” As AT&T has explained in that docket, AT&T already provides consumers numerous ways to track and monitor their usage, including courtesy alerts when a customer

wireless providers normally recover those subsidies over the life of a contract, but cannot do so when a customer ends a contract early.”).

¹⁷⁵ Letter from Robert W. Quinn (AT&T) to Joel Gurin and Ruth Milkman (FCC), *Re: AT&T’s Early Contract Termination Policy*, CG Docket No. 09-158, at 10 (Feb. 23, 2010).

reaches 65% and 90% of their data plan's limit.¹⁷⁶ Although the European Union adopted certain "bill shock" rules in 2009, those regulations govern only intra-EU roaming charges, which can be high; mandating similar types of measures in this country will only stifle innovative pricing and terms.¹⁷⁷

¹⁷⁶ Comments of AT&T Inc., *Measures Designed to Assist US Wireless Consumers to Avoid Bill Shock*, CG Docket No. 09-158, at 2 (July 6, 2010).

¹⁷⁷ *Id.* at 2 & n.4.

CONCLUSION

For the foregoing reasons, the Commission should find in the Fifteenth Report that wireless markets are intensely competitive.

Respectfully Submitted,

/s/ Michael P. Goggin

David L. Lawson
James P. Young
Christopher T. Shenk
SIDLEY AUSTIN LLP
1501 K Street, N.W.
Washington, D.C. 20005
202-736-8088

Michael P. Goggin
Gary L. Phillips
Paul K. Mancini
AT&T Inc.
1120 20th Street, N.W.
Washington, D.C. 20036
202-457-2055

Its Attorneys

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Thinking About Openness in the Telecommunications Policy Context

Ashish Shah
Engineering and Public Policy
Carnegie Mellon University
ashishs@andrew.cmu.edu

Douglas C. Sicker
Department of Computer Science
University of Colorado at Boulder
douglas.sicker@colorado.edu

Dale N. Hatfield
Interdisciplinary Telecommunications Program
University of Colorado at Boulder
dale.hatfield@colorado.edu

Abstract

In recent years, issues associated with “openness” have taken on increased importance in the development of telecommunications policy. For example, the concept of Open Network Architecture was hotly debated in the context of the Federal Communications Commission’s Computer Inquiry III proceeding. The phenomenal success of the Internet is often attributed to its reliance upon open, non-proprietary standards. Recently, open access has been a contentious topic in terms of cable television company provision of Internet access services. Despite its importance, the term “open” is often not clearly defined, is often taken to mean different things in different contexts and has vastly different implications depending upon what level of the protocol stack is being considered.

It is not our purpose in this paper to advocate any particular degree of openness or to critique past commercial and regulatory decisions dealing with the topic. Rather, in this paper, we seek to explain and to offer a clearer, more unified and consistent definition of what constitutes openness. We do so in the context of the different levels of the protocol stacks that comprise modern data communications networks. We focus particular attention on the Internet suite of protocols (e.g., TCP/IP) and its relationship to the other layers. Where applicable, we identify and describe recent changes in network architectures that impact on the openness in different layers. We also discuss the changing commercial, technological and regulatory developments that might motivate these changes.

1. Introduction

In recent years, issues associated with “openness” have taken on increased importance in the development of telecommunications policy. For example, the concept of Open Network Architecture was hotly debated in the context of the Federal Communications Commission’s Computer Inquiry III proceeding. The phenomenal success of the Internet is often attributed to its reliance upon open, non-proprietary standards. Recently, open access has been a contentious topic in terms of cable television company provision of Internet access services. Despite its importance, the term “open” is often not clearly defined, is often taken to mean different things in different contexts and has vastly different implications depending upon what level of the protocol stack is being considered. Sicker and Mindel point out the broad and varied use of openness in such areas as standards, architectures, interconnection, interoperability, software, and content.¹

It is not our purpose in this paper to advocate any particular degree of openness or to critique past commercial and regulatory decisions dealing with the topic. Rather, in this paper, we seek to explain and to offer a clearer, more unified and consistent definition of what constitutes openness. We do so in the context of the different levels of the protocol stacks that comprises modern data communications networks. We focus particular attention on the Internet suite of protocols (e.g., TCP/IP) and its relationship to the other layers. In undertaking this layer-based analysis, we assess “openness” by asking two questions: (1) can the information be delivered and/or (2) is there discrimination against the delivery of this information? Where applicable, we also identify and describe recent changes in network architectures that affect openness in different layers. Changing commercial, technological, and regulatory developments may also affect openness. For example, an otherwise open network may be closed or partially closed by the use of content filters deployed in response to security threats; by content filters designed to protect a user against spam; or by content filters designed to exclude a competitor’s traffic. In this case, the choice may be prompted by sound security policies, by an individual’s email preference, or by a competitive pressure. The point is that the openness of a system may be altered for various reasons.

We begin this paper with a survey examining the use of the term openness as it applies to telecommunications. The purpose of this survey is twofold. First, it allows us to point out the broad, liberal and sometimes inconsistent use of the term. Second, it allows us to extract some common concepts for what defines openness. Next, we describe existing layered network protocol models and then propose a layered model for examining the issue of openness. Lastly, we apply this model to examine different examples of openness at various layers of the model.

2. A Survey of Openness

In this section, we provide a survey of how the term openness has been used and defined in the worlds of telecommunications and information technology. As we will show, the definition of openness differs substantially across (and within) various domains. Our goals are to:

- Highlight the broad, liberal and sometimes inconsistent use of the term, and
- Attempt to extract some common principles.

While this latter goal may not be possible given the hotly debated nature of the topic, we will nonetheless attempt to identify some common concepts.

¹ See - Sicker, Douglas and Joshua Mindel, “Refinements of a Layered Model for Telecommunications Policy” - Journal on Telecommunications and High Technology Law, Volume 1, Pages 69-94.

2.1. Perspectives on Openness

In this section, we examine the various definitions and perspectives applied to the term openness. We examine openness in terms of other important, related concepts including Open Network Architectures, interoperability, open access, open source, open standards, unbundled network elements, interconnection, proprietary/non-proprietary, and the “end-to-end” design principle.

2.1.1. Open Network Architectures and Interoperability

We first consider the FCC Open Network Architecture requirements. In May 1986, in its Third Computer Inquiry, also known as the Computer III Decision², the Federal Communications Commission (FCC) introduced the concept of an Open Network Architecture (ONA), which represents an attempt to create free market conditions within the telecommunications industry through regulation.

In the Commission’s words: “ONA is the overall design of a carrier’s basic network services to permit all users of the basic network, including the information services operations of the carrier and its competitors, to interconnect to specific basic network functions and interfaces on an unbundled and equal-access basis. The BOCs and GTE through ONA must unbundle key components, or elements, of their basic services and make them available under tariff, regardless of whether their information services operations utilize the unbundled components. Such unbundling ensures that competitors of the carrier’s information services operations can develop information services that utilize the carrier’s network on an economical and efficient basis.”

According to the Open Network Architecture mandate, the carriers were required to provide the independent Enhanced Service Providers (ESPs) access to basic communications services on an equal basis and at an equal cost to those enjoyed by the carriers’ own Enhanced Service operations. Such an architecture was perceived as a means of creating an open market, allowing various service providers to compete on an equal basis.

Hence, in this example, openness refers to access to network elements, interoperability and design. As such, this is a broad application of the term openness in that it includes functional elements (unbundled services), pricing (tariffs) and design specifications. The motivation behind this model of openness was to provide competitors the elements perceived as necessary to build information services.

2.1.2. Unbundled Network Elements

Unbundled network elements or UNEs have important open access implications. Unbundled network elements refer to the parts of the incumbent telecommunication provider’s network that can be leased by competitive local exchange carriers (CLECs). This allowed the CLECs to compete with the incumbent without building or using their own facilities.

The FCC identified certain network elements that must be unbundled, without which the requesting carriers would be impaired.³ These network elements (loops, subloops, network interface devices, local circuit switching, interoffice transmission facilities, operations support system and so on) were

² Computer III Order 1999, 14 FCC Rcd at 4298, ¶ 8 n. 15. See also Computer III Remand 1995, 10 FCC Rcd 8366, ¶¶ 15-16.

³ See – Third Report and Order and Fourth Further Notice of Proposed Rulemaking, In the Matter of Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, released Nov 05, 1999.

required to be unbundled by the ILECs at the request of the CLECs who wished to offer their own service as an alternative to the incumbent's services.⁴

The FCC perceived that access to UNEs would allow new entrants to compete in the market and provide customers with the choice of an alternative service provider. Unlike resale, these new entrants would compete with the ILECs by offering differentiated services and lower price packages.⁵

In this example of openness, the focus is on architectural choice and regulatory obligations, wherein a competitor could openly access elements of the incumbent's network. As in the example of open network architecture, the motivation behind this mandate was to provide competitors the elements necessary to build information services.

2.1.3. Open Access

We next examine open access. Cable open access requires the cable companies to provide multiple ISPs access to their systems. This would enable the competing ISPs to offer their service to customers on the cable platform. However, cable companies are not required by law to open their systems to such competition, unlike the telephone companies, which are subject to regulation as specified under Title II of the Telecommunications Act.⁶ The cable industry is not regulated as a Title II common carrier.

The recent FCC declaratory ruling and notice of proposed rulemaking concludes, "the cable modem service, as it is currently offered, is properly classified as an interstate information service, not as a cable service, and that there is no separate offering of telecommunications service."⁷ Hence, although cable and telephone companies both provide almost substitutable broadband services, they are regulated differently. This issue continues to be a source of great contention. Cable companies deploying broadband technology are bundling ISP services along with their access facilities. This prevents their users from selecting an Internet Service Provider (ISP) of their choice (without also using and paying for the cable ISP). According to Lemley and Lessig, the explanation for adopting such a single-ISP architecture could be that "only by fully controlling content and traffic over the

⁴ Later, the high frequency component of the loop was also added as an element that must be unbundled on a national basis. See - Deployment of Wireline Services Offering Advanced Telecommunications Capability and Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, Third Report and Order in CC Docket No. 98-147 and Fourth Report and Order in CC Docket No. 96-98, 14 FCC Rcd 20912 (1999) (Line Sharing Order). The Commission addressed line-sharing issues in a separate proceeding so that it could more fully develop a record on specific technical and operational issues relating to such unbundling.

⁵ Cable modem and Digital Subscriber Line (DSL) are the two most popular and widely deployed broadband technologies, while other technologies, such as wireless, satellite and power line are still in nascent stage of deployment. Although DSL and cable modem have an almost identical broadband offering, they differ greatly in the way they are regulated. Telephone companies are common carriers and are subject to regulation as specified under Title II of the Telecommunications Act of 1996. Title II requires common carriers to allow other telecommunications carriers to interconnect with their facilities, and it requires them to sell their telecommunications services to other telecommunications carriers for a reasonable price.

⁶ Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (codified as amended in scattered sections of 15, 18 and 47 U.S.C.) [hereinafter 1996 Act]. The 1996 Act amends the Communications Act of 1934, 47 U.S.C. §§151 et. seq.

⁷ See - FCC Notice of Proposed Rulemaking; 'In the Matter of Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities.' CS Docket No. 02-52, March 15, 2002.

network can they reap the profits necessary to finance the upgrade of their infrastructure”.⁸ It makes sense to give the cable operators incentives that would encourage them to invest in broadband infrastructure. However, some may argue allowing them to have monopoly power over a competitive ISP market may not be the best way to provide these incentives.⁹

The FCC has so far adopted a Wait-and-Watch approach in this matter. They indicated that broadband services should exist in a minimum regulatory environment that promotes investment and innovation in a competitive market. However, they also indicated that the Commission must be alert and ready to act against anticompetitive risks and discriminatory provisioning by dominant providers that result in consumer harm.¹⁰ Again, while it is not our purpose here to critique the approach adopted by the FCC (or the industry), such regulatory restraint could come at a price, as it is very difficult to reverse an already adopted technical architecture once the infrastructure is built and investment is made.

In December 2001, Columbia Telecommunications Corporation prepared a report for the American Civil Liberties Union (ACLU) defining cable open access, stating the following.¹¹

This report uses the term "open access" to refer to the ability of competing Internet Service Providers to offer services over cable systems, assuming both of the following essential technical requirements are met:

(1) the technical architecture or its configuration enable ISPs to offer the services they wish without constraints imposed by the cable company for non-technical reasons; and (2) the technical architecture or its configuration precludes the cable company from manipulating or monitoring the content of the data transmissions sent and received by the ISPs' customers. Under this definition, simple access by multiple ISPs (as in the "rebranding" scenario favored by some cable operators) is not open access because the cable company controls the services the ISP can offer and is able to manipulate and monitor data.

In this example (and from one side of the debate), much like unbundled network elements, openness refers to an architectural design choice; one that is linked to the competitive provision of ISP services. Obviously, this architectural choice can be influenced by a commercial motivation or regulation. In the DSL space, open access is driven by regulation. However, since the cable operators are not subject to such regulation, their choice of architecture is mainly driven by technical and commercial motivations or business arrangements.

⁸ See Mark Lemley and Lawrence Lessig: "The End of End-to-End: Preserving the Architecture of the Internet in the Broadband Era."

⁹ The consequence of such bundling practices could effectively reduce competition among ISP's serving residential broadband cable. Further, the services offered to the consumers would be determined by the few ISP's either owned or affiliated with the cable company. These ISP's could then have the power to discriminate in the choice of Internet services they allow and the customers would have to accept their choice. This would empower the ISP's and hence the cable companies to control the content and services to which their customers have access. Giving such power to discriminate to the owner of the actual network infrastructure may be viewed as inconsistent with the end-to-end philosophy of the Internet.

¹⁰ In the Matter of Appropriate Framework for Broadband Access to the Internet over Wireline Facilities: FCC Notice of Proposed Rulemaking, CC Docket No. 02-33.

¹¹ See – "Technological Analysis of Cable Open Access and Cable Television Systems": Columbia Telecommunications Corporation; http://archive.aclu.org/issues/cyber/broadband_report.pdf

2.1.4. End-to-End Design Principle

In this section, we consider the end-to-end network design principle. The success of the Internet is often attributed to its reliance upon non-proprietary standards and open architectures. Part of the open architecture is the notion of the end-to-end design principle. The end-to-end argument is a set of architectural principles that characterize how the Internet has been designed. Specifically, it describes a network design where intelligence resides at the end devices and the network does not impede communications between the end devices. In this section, we describe the underlying concept of the end-to-end design principle and discuss its benefits. Jerome Saltzer, David Clark and David Reed were the first to articulate the end-to-end design principle. According to RFC 1958:

The basic argument is that, as a first principle, certain required end-to-end functions can only be performed correctly by the end-systems themselves. A specific case is that any network, however carefully designed, will be subject to failures of transmission at some statistically determined rate. The best way to cope with this is to accept it, and give responsibility for the integrity of communication to the end systems.¹²

Blumenthal and Clark revisited the issue and described the benefits of the end-to-end design as the following:¹³

- Lower cost in core of network
- User control and power
- Conducive to innovation
- Greater flexibility
- Facilitates competition
- Better reliability

Several of these benefits may be perceived as relating to openness. In terms of user control, rather than relying upon the creativity of a small group of innovators who might work for the companies that control the network, the end-to-end design enables anyone with an Internet connection to design and implement a better way to use the Internet. According to the end-to-end design principle, the network is kept neutral and intelligence resides at the end nodes, users should have the freedom to design any sort of Internet applications as long as they run on the underlying network. The end-to-end principle is still very relevant today and continues to guide technical development of Internet standards.¹⁴

Hence, in end-to-end design, openness refers to the ability to communicate end-to-end and includes a broad range of concepts such as design principles and element behavior. Arguably, the end-to-end design is the broadest application of openness.

2.1.5. Internet Interconnection

In this section, we consider interconnection. While interconnection is itself a broad topic, we focus here on Internet interconnection. One of the most important values of the Internet lies in its ability to connect a user to all other users, independent of their geographical location. This can happen only

¹² See – Request for Comments: 1958, “Architectural Principles of the Internet” available at <http://www.faqs.org/rfcs/rfc1958.html> visited 07/22/2003.

¹³ See – “Rethinking the design of the Internet: The end to end arguments vs. the brave new world”: David Clark and Marjory Blumenthal available at <http://www.ngi-supernet.org/NGI-PI-2000/Clark.PDF> visited 07/22/2003

¹⁴ See – Kempf, James and Rob Austein, “The Rise of the Middle and the Future of End to End: Reflections of the Evolution of the Internet Architecture”, Internet Draft, April 2003 – available at <http://www.iab.org/drafts/draft-iab-e2e-futures-03.txt> visited 08/07/2003

when the huge numbers of networks (LAN, WAN, backbone, etc.) are interconnected to each other through proper interconnection agreements. However, unlike the telcos, an Internet service provider is not regulated under Title II interconnection obligations. Therefore, an Internet service provider must seek commercially based interconnection agreements, which then form the basis for the price, quality and reliability of its connection to the rest of the Internet. As such, this interconnection process is a complex blend of technical and business matters. Two types of interconnection arrangements are common: the peering arrangement and the transit arrangement. In the peering arrangement, the peering partners exchange traffic on a settlement-free basis.¹⁵ In a transit arrangement, one network pays another network to carry its traffic.

Peering arrangements generally take place between equal sized networks with a comparable geographical presence. A large network is less likely to peer with a smaller network since it would not benefit much from the other network's infrastructure and would have to carry a large amount of traffic of the smaller network. In a transit arrangement, the network charging the customer network for interconnection is not only responsible for carrying traffic destined for its network, but also has to carry traffic destined for any of its peering partners. It is common practice for a network to have peering and transit arrangements with other networks. For example, it would make sense for a low tier network to peer with the other local low tier networks and get into transit arrangements with a tier 1-backbone network in order to obtain access to not only those tier 1 networks, but also their peering partners.

The process of gaining a tier one peering agreement (peering with the big backbone providers) was a topic of considerable debate a few years ago; however, this issue has not received much attention lately. Nonetheless, this type of interconnection holds the same potential for abuse as any other interconnection process, wherein discrimination, market abuse and collusion might occur.

In this example, openness refers the ability to negotiate interconnection through a peering arrangement or a transit agreement with another network provider. This process can be driven by regulation or by the market.

2.1.6. Network Neutrality

In this section, we consider network neutrality. An open network typically refers to an architectural arrangement or design, particularly as it relates to access technology. Network neutrality on the other hand is the ability to choose among Internet-based information, products and services. Wu recently addressed the relationship among concepts like open-access, network neutrality and broadband discrimination.¹⁶ According to Wu, a network is said to be neutral if it does not favor one application over another. Amazon.com positioned network neutrality as the freedom of choice in information, products and services. In its comments to the FCC Amazon.com stated, "Amazon.com believes that the most important freedom of choice to preserve and protect in this proceeding (CS Docket No. 02-52) is unimpeded consumer access to all Internet-based information, products and services."¹⁷ They

¹⁵ "The Digital Handshake: Connecting Internet Backbones": Michael Kende: Working Paper – Office of Plans and Policy, Federal Communications Commission.

¹⁶ See – "Network Neutrality and Broadband Discrimination," Tim Wu – available at <http://faculty.virginia.edu/timwu/bbd.pdf> visited 08/07/2003.

¹⁷ See Comments by amazon.com to FCC Notice of Proposed Rulemaking - In the Matter of Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities. CS Docket No. 02-52, March 15, 2002, available at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513198055 visited 08/03/2003

described various ways in which ISPs may impede consumer access (blocking or redirecting addresses, adopting differing quality of service mechanisms and so on.). Finally, amazon.com stated that network neutrality could be realized by adopting an open-access architecture, a philosophy different from that of Wu. Again referring to their comments, "...if only one ISP were available for broadband access, it would have many economic incentives, and no competition-based disincentives, to impede consumer access to select information, products and services."

Hence, in the context of network neutrality, openness may be defined as nondiscriminatory access to services and products on the Internet.

2.1.7. Open Source Initiative

We next examine open source software. Generally, open source refers to access to source code, made available for use to the public. Open source software is generally developed as a public collaboration and made freely available. "The basic idea behind open source is very simple: When programmers can read, redistribute, and modify the source code for a piece of software, the software evolves. People improve it, people adapt it, people fix bugs. And this can happen at a speed that, if one is used to the slow pace of conventional software development, seems astonishing."¹⁸ The concept relies on peer review to find and eliminate bugs in the program code, a process that commercially developed and packaged programs do not utilize. Users/programmers on the Internet read, redistribute and modify the source code, forcing an evolution of the product.

However, open source might not only mean access to source code. Open Source Initiative (OSI) dictates that in order to be considered "OSI Certified" a product must meet certain specific criteria. A few of them are mentioned below:¹⁹

- Free Redistribution
- Source code must be made available and its free distribution must be permitted. Also, the source code should be in a format in which it can be easily modified.
- No discrimination against persons or groups
- No person, group or field of endeavor can be denied access to the program.
- License must not be specific to a product.
- The licensed software should not place restrictions on other software that is distributed with it.
- The license must be technology-neutral.
- The author must allow modifications and derivations of the work under the program's original name.²⁰

The history of the GNU/UNIX operating system is an example that meets the above-mentioned criteria. Although GNU had no technical advantage over UNIX, its principal advantage and selling point was that it was free software. The terms free software and open-source software are often interchangeably used. According to Richard Stallman, "Free software and Open Source describe the same category of software, more or less, but say different things about the software and about values. The GNU project continues to use the term free software to express the idea that freedom, not just

¹⁸ www.opensource.org – 06/25/2003

¹⁹ For a complete list of these criteria and the definition of 'Open Source', see the open source website at www.opensource.com

²⁰ http://www.webopedia.com/TERM/o/open_source.html - 06/27/2003.

technology, is important.”²¹ According to Stallman, the term “free software” is sometimes misunderstood and linked to price. Stallman argues that “free” refers to freedom not in price, but in:

- The freedom to run the program, for any purpose
- The freedom to modify the program to suit your needs (To make this freedom effective in practice, you must have access to the source code, since making changes in a program without having the source code is exceedingly difficult.)
- The freedom to redistribute copies, either gratis or for a fee
- The freedom to distribute modified versions of the program, so that the community can benefit from your improvements

Hence, in this example openness refers to the access to source code and the ability to review, use, modify and distribute it.

2.1.8. Open Standards and Reference Models

We next consider standards bodies. We consider a number of ‘open’ standards bodies, each with a slightly different perspective on what embodies an open standards process.

2.1.8.1. ISO

The International Organization for Standardization (ISO) created the Reference Model of Open System Interconnection consisting of seven layers to describe networked systems. One can think of a reference model or a set of protocols as being open, much like open source.²² The Open System Interconnection defines a reference model for data communication that provides a layered approach to the functions. This ensures that the whole process is divided into manageable pieces, and not one single layer is too complex. Natural boundaries between the functions are used to determine the layers i.e., similar or associated functions are grouped together in one layer. It also ensures that easy changes can be made within one layer, as need arises, without affecting other layers.

Various principles were applied to arrive at the seven layers. The RAD data communications website lists a few of these principles:²³

- A layer should be created where a different level of abstraction is needed.
- Each layer should perform a well-defined function.
- The function of each layer should be chosen with an eye toward defining internationally standardized protocols.
- The layer boundaries should be chosen to minimize the information flow across the interfaces.
- The number of layers should be large enough that distinct functions need not be thrown together in the same layer out of necessity, and small enough that the architecture does not become unwieldy.

²¹ See Richard Stallman, *The GNU Operating System and the Free Software Movement*, in *OPEN SOURCES—VOICES FROM THE OPEN SOURCE REVOLUTION*, available at <http://www.oreilly.com/catalog/opensources/book/stallman.html> visited 07/23/2003.

²² A protocol (or a set of protocols) can be considered to be open if its specifications (source – in the case of code) are open or freely available to the public.

²³ See – “The OSI Reference Model”, available at <http://www2.rad.com/networks/1994/osi/osi.htm> visited 08/29/2003.

Hence, in this example, openness is defined as well-specified interfaces between each layer. This allows different network operating systems and protocols to work together by having each manufacturer adhere to the standard interfaces. This ‘open’ approach is well recognized and applied by most standards bodies, including the two that follow.

2.1.8.2. IETF

The Internet Engineering Task Force (IETF) is a large open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. It is open to any interested individual.²⁴ The IETF working groups defined and created the routing, management, transport and security standards, which define the Transmission Control Protocol/Internet Protocol (TCP/IP) Suite. The TCP/IP suite is a set of communication protocols used to connect devices on the Internet. As such, it has become the de facto standard for transmitting data over networks. The TCP/IP protocol uses a whole family of protocols, two of which being TCP (a transport control protocol) and IP (a network protocol). The TCP/IP protocol is a layered protocol with each layer corresponding to a different facet of communications. Such an approach allows a single complex job to be broken down in to simpler manageable tasks. The set of protocols used by the TCP/IP suite are public and their details are freely available. Any computer manufacturer or software developer is free to produce software that takes advantage of or uses these protocols. Furthermore, anyone can participate in the process of changing the protocols, through the IETF.

According to Scott Bradner:

The IETF and its standards have succeeded for the same sorts of reasons that the Open Source community is taking off. IETF standards are developed in an open, all-inclusive process in which any interested individual can participate. All IETF documents are freely available over the Internet and can be reproduced at will. In fact, the IETF's open document process is a case study in the potential of the Open Source movement.²⁵

All of the IETF documents are openly available. Even IETF mailing lists and meetings are open, not limited only to members and not requiring a fee. In order to meet the needs of the user and the vendor community, active participation from these communities is encouraged during the standards development process. This open participation allows even students or developers from small startups to understand, and thus make use of, the standards.

Hence, openness is defined to mean open participation, free and widely available documentations, and non-proprietary.

2.1.8.3. IEEE

The Institute of Electrical and Electronics Engineers, Inc., (IEEE) is a non-profit, technical professional association of more than 380,000 individual members in 150 countries.²⁶ IEEE is an organization comprised of engineers, scientists and students. The IEEE is best known for developing standards for the computer and electronics industry. IEEE standards follow a well-defined path from concept to completion, guided by a set of five basic principles: due process, openness, consensus,

²⁴ See - <http://www.ietf.org/overview.html> visited 08/05/2003

²⁵ See – Essay by Scott Bradner, “The Internet Engineering Task Force” – available at <http://www.openresources.com/documents/open-sources/node35.html> visited 08/05/2003

²⁶ See – www.ieee.org visited 08/05/2003.

balance and right of appeal. The IEEE addresses at least two types of openness. One ensures that all interested parties can participate actively in the IEEE standards development process.²⁷ For example, all meetings of IEEE 802 are open to individuals who wish to participate in the standards development, and balance is achieved by encouraging wide points of view from different areas of technology.²⁸ A second type defines an open system, “An open system provides capabilities that enable properly implemented applications to run on a variety of platforms from multiple vendors, interoperate with other systems applications, and present a consistent style of interaction with the user.”²⁹

2.1.8.4. Summary

In this example, openness refers to the variety of perspectives within several open standards bodies. For example, the OSI model stresses the importance of open communication between systems, irrespective of type and manufacturer, by virtue of their mutual adherence to a set of standards. The IETF stresses bottom-up organization, participation and access; where anyone can participate in the development process and all aspects of the process are free and publicly available. Finally, the IEEE stresses that the underlying standard must be vendor neutral, consensus driven and distributed widely. Much of what differentiates these bodies lies in the philosophical differences in the approach to the problem, and is worthy of separate examination.

2.1.9. Proprietary Standards

In this section, we examine proprietary standards. Proprietary standards are common in the market and co-exist along with open standards. In the telecommunications and computer industry, the term proprietary is very often used to mean the opposite of open. Anything proprietary is viewed as one that is owned by a company or an individual. It also implies that the owner of the proprietary content/code/design has not divulged specifications that would allow others to have access.³⁰ While open standards help customers avoid being locked into goods and services from a particular firm, vendors often see themselves as more likely to profit if their proprietary standard is adopted in the market place.

In regards to proprietary standards, openness refers to the degree in which the specifications of a standard are made readily available.

²⁷ See - <http://standards.ieee.org/announcements/background.html> visited 08/05/2003

²⁸ The IEEE 802 Local and Metropolitan Area Network (LAN/MAN) Standards Committee has a basic charter to create, maintain and encourage the use of IEEE standards primarily within layers 1 and 2 of the Open System Interconnection (OSI) Reference Model. See “802 perspectives” – available at <http://www.comsoc.org/ni/Public/2001/May/ni802.html> visited 08/07/2003

²⁹ See – 1003.0-1995 IEEE Guide to the POSIX Open System Environment (ANSI/IEEE), ISBN No.0-7381-3138-5

³⁰ However, as Maxwell points out, something that is proprietary can be incorporated into open standards. He states, “Firms have also pressed to have their proprietary elements included in open standards such as those established by the World Wide Web Consortium (W3C) and other standards-setting bodies. Many open standards include material that has been previously patented, but has either been “donated” or is made available on a royalty free basis or on “reasonable and non-discriminatory” terms.” This gives a twist to the term proprietary. Maxwell, Elliot, a talk entitled, “Openness and the Digital Economy: Building on the Past, Shaping the Future,” 2002.

2.2. Common Principles

From the selection of perspectives presented above, one can see the broad application of the term openness. We can reduce the above perspectives to a more limited set of items, including open access to:

- physical elements (e.g., poles, spectrum, UNEs)
- content and resources (e.g., network neutrality, UNEs)
- code (e.g., software)
- specifications (e.g., standards)
- interconnection (e.g., peering or transit)
- participation (e.g., standards)

These items might further be reduced to unimpeded or freely available access to:

- resources
- processes

While recognizing that the above items do not represent all aspects of openness, they do provide an initial point for considering what is common to these items. Further, from this list we can think about what constitutes a reasonable perspective to take when considering openness in the context of telecommunications. As described above, the nature of this openness might vary depending on perspective, situation and element. It is an inherently subjective concept, and as such, it is unlikely that one definition will suffice for all. Nonetheless, we can consider ways of approaching or considering the general concept of openness. To do this, we considered what concepts might transcend the individual application of openness, particularly one that might place it in terms relevant to public policy.

As we survey the above definitions of openness, we find that non-discriminatory access is an integral aspect defining openness in the context of UNEs, cable open access and interconnection. However, this concept only makes sense in terms of a scarce resource. In other words, if there are alternatives to this resource or process, then the issue of discrimination is less concerning. Thus, we can draw these two broad commonalities for a general assessment of openness, as they are shared elements in defining openness across these discrete contexts.

Therefore, the two concepts that stand out in terms of assessing the openness of a resource or process include:

1. Is there discrimination in accessing the resource or process?
2. Is there an alternative to the resource or process?

Therefore, as part of our examination, we consider these questions in assessing the degree of openness of a system. A third concept to consider would be:

3. Is participation in determining the future design or operation of telecommunications being impaired?

We see that the third is just another form of discrimination. In the following section, we describe a model one could apply when making this assessment.

3. Layered Models

Our model of analysis uses the layered protocol model as a lens or framework for analyzing openness. Thus in this section, we provide a brief tutorial on the basic ideas behind protocols and protocol layering. We also describe the Open System Interconnection (OSI) and Transmission Control

Protocol/Internet Protocol (TCP/IP) model and highlight the significance of the layered approach and its impact on openness. We then propose our model for examining openness.

3.1. Protocol Layering

A computer network can be conceived as a series of connections between computers that allow them to communicate. The content, scope, size, speed, and reliability of the network vary depending on its protocols and implementation. Protocols are a pre-established means of communication. They are nothing but a set of valid messages, a set of rules and formats that govern the communication between two communicating peers.³¹ Protocol layering is a common technique to simplify networking designs by dividing them into functional layers, and assigning protocols to perform each layer's task. Protocol layering produces simple protocols, each with a few well-defined tasks. The concept of layering relies on breaking a complex task into smaller subsets, each of which addresses a specific issue. Each layer provides a well-defined set of services to the layers above it and depends on lower layers for its own foundation.³²

The Internet protocols are arranged in essentially independent, unbundled layers with the Internet Protocol (IP) itself at the “waist” of the stack. The protocol stack broadens above the waist to support a wide range of transport and application layers including email, the Worldwide Web, file transfer protocols, remote login, etc. The protocol stack broadens below the waist to ride on a wide range of underlying networks using a variety of technologies including frame relay, ATM, ADSI, fiber optic systems, and so on. Modularity promotes fair and open competition between and among providers of the different layers by allowing competitors to compete with products that will interoperate. The modularity/stratification coupled with openness facilitates the introduction of new transmission technologies and new applications thereby stimulating innovation.

3.2. Open System Interconnection (OSI) Stack

As previously described, the International Organization for Standardization (ISO) created the seven layer Reference Model of Open System Interconnection to describe networked systems. This now familiar model can be depicted as follows:

³¹ For a detailed explanation of protocol Layering, see – “Protocol Layering: An Engineering Approach to Computer Networking” by S Keshav available at http://www.cs.cornell.edu/skeshav/book/slides/protocol_layering/ppframe.htm visited 07/22/2003.

³² See - <http://www.freesoft.org/CIE/Course/Section1/4.htm> : “Protocol Layering,” visited 08/10/2003.

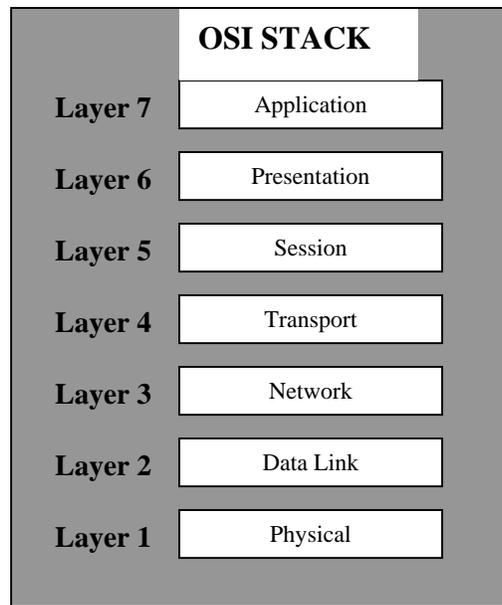


Figure 1: OSI Reference Model

Each of these layers has a set of specific functions associated with it. Starting at the bottom of the stack.³³

Physical: covers the network hardware, physical cabling or a wireless electromagnetic connection. It also deals with electrical specifications, collision control and other low-level functions.

Data Link: attempts to make the physical link reliable and provides the means to activate, maintain and deactivate the link.

Network: provides for transfer of packets between end systems across a communications network.

Transport: provides a mechanism for the reliable, transparent exchange of data between end-points across a network.

Session: provides the mechanism for controlling the dialogue between applications in end systems, such as starting and terminating sessions.

Presentation: defines the format of the data to be exchanged between different applications and offers application programs a set of data transformation services.

Application: Provides entry points for user programs to control transmission of data to and from other machines. It contains management functions and generally useful mechanisms to support distributed applications.

³³ For a detailed explanation on the OSI reference model and description of each layer, see – Stallings, William, “Data and Computer Communications”, Sixth Edition, Pages 51-54 – ISBN no. 81-7808-442-2.

3.3. Transmission Control Protocol/Internet Protocol (TCP/IP) Suite

As mentioned earlier, the term TCP/IP (Transmission Control Protocol/Internet Protocol) actually refers to a whole family of protocols, of which TCP and IP are just two. TCP/IP, developed in 1969 by the U.S Department of Defense Advanced Research Projects Agency (DARPA), is an industry-standard suite of protocols designed to provide high-speed communication network links. TCP/IP protocols map to a four-layer conceptual model known as the DARPA model, named after the U.S. government agency that initially developed TCP/IP. The four layers of the TCP/IP suite are: Application, Transport, Internet, and Network Interface. Each layer in the TCP/IP suite corresponds to one or more layers of the seven-layer Open Systems Interconnection (OSI) model.³⁴

Network Interface Layer: The network interface layer is the lowest layer in the Internet reference model. It corresponds to the physical and data link layers of the OSI model. This layer contains the protocols used to deliver data to the other computers and devices that are attached to the network. TCP/IP was designed to be independent of the network access platform. In this way, TCP/IP can be used to connect differing network technologies such as Ethernet, ATM or Frame Relay. Independence from any specific network technology gives TCP/IP the ability to be adapted to new technologies.

Internet Layer: This layer is responsible for routing messages through networks. The Internet layer is similar to the Network layer of the OSI stack explained earlier.

Transport Layer: The protocol layer just above the Internet layer is the transport layer. It is responsible for the reliability and integrity of the communications. It is similar to the transport layer of the OSI stack mentioned earlier.

Application Layer: The application layer is the highest layer of the TCP/IP protocol stack. It maps to the upper three layers of the OSI model. It provides applications the ability to access the services of the other layers and defines the protocols that applications use to exchange data.³⁵

The TCP/IP protocol suite is quite similar to the OSI reference model and both contributed to the other. The main differences between the OSI architecture and that of TCP/IP relate to the layers above the transport layer (layer 4) and those below the network layer (layer 3). OSI has both, the session layer and the presentation layer, whereas TCP/IP combines them into the application layer. Also, TCP/IP combines OSI's physical layer and data link layer into a network interface level. The figure below shows the basic layering approach in both the schemes.

³⁴ See – Microsoft white paper, “Introduction to TCP/IP” – available at <http://www.microsoft.com/ntserver/zipdocs/TCPIntrowp.doc> visited 08/05/2003.

³⁵ See – Cisco Documentation, “Understanding TCP/IP” – available at <http://www.cisco.com/univercd/cc/td/doc/product/iaabu/centri4/user/scf4ap1.pdf> visited 08/05/2003.

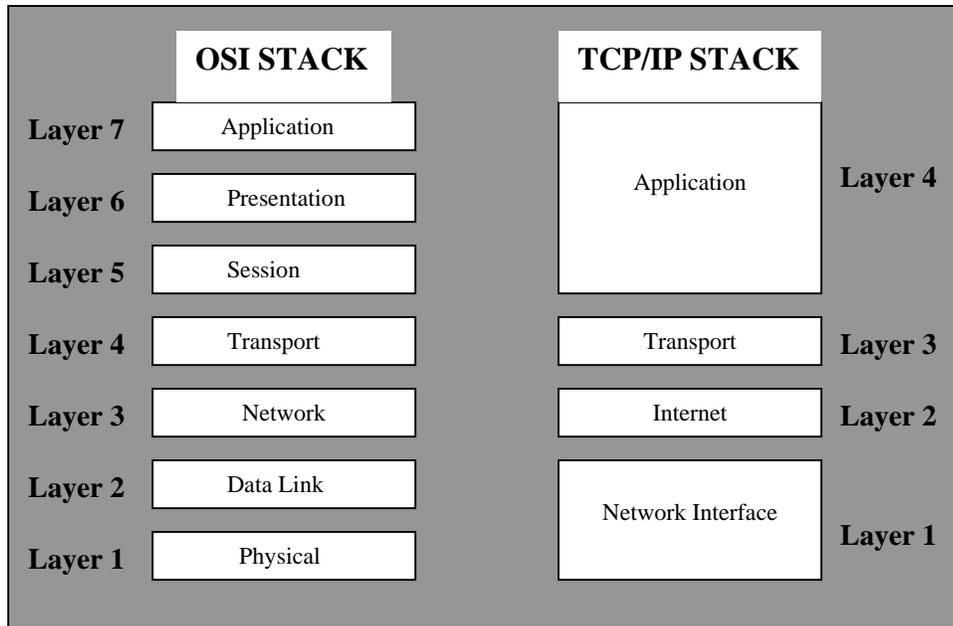


Figure 2: OSI versus TCP/IP

3.4. Our Model

Several authors have examined the application of layered models to the analysis of the policy and technology issues.³⁶ These models substantially modify traditional protocol layered models to provide a tool for market and policy analysis. Since the analysis undertaken in this paper is more closely tied to technology, we propose a model that closely resembles a traditional protocol stack. We model our analysis roughly around the OSI reference model and TCP/IP protocol suite. As such, we examine technology and business aspects of openness associated with each layer of the model. We add a Layer 0 to represent the physical and power related issues not generally captured in layer 1. We also add a Layer 6, which includes issues beyond the layered model and other non-conforming topics. This includes process related issues, such as standards participation and interconnection negotiations.

³⁶ See F. M. Bar, *Configuring the Telecommunications Infrastructure for the Computer Age: The Economics of Network Control* (1990) (Ph.D. thesis, University of California, Berkeley); Sicker, D.C., and Mindel, J., "Refinements of a Layered Model for Telecommunications Policy," *Journal of Telecommunications and High Technology Law*, vol.1, issue 1, 2002.; J. Weinberg, *The Internet and Telecommunications Services, Universal Service Mechanisms, Access Charges and Other Flotsam of the Regulatory System*, Telecommunications Policy Research Conference (1998), available at <http://www.law.wayne.edu/weinberg/FLOTSAM.a04.PDF>.

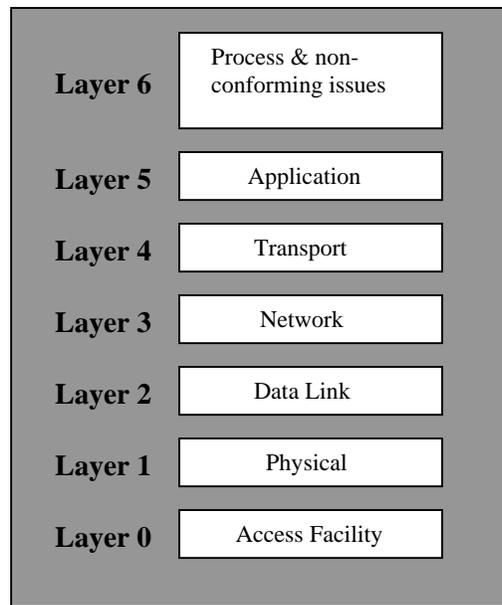


Figure 3: Our Model

In undertaking this layer-based analysis, we assess “openness” by asking the question: if the resource or process is closed because of discrimination, are there alternatives? Where applicable, we also identify and describe recent changes in network architectures that affect openness in different layers. Again, it is not our purpose in this paper to advocate any particular degree of openness or to critique past commercial and regulatory decisions dealing with the topic. Rather, in this paper, we seek to explain and to offer a clearer, more unified and consistent definition of what constitutes openness. In other words, just because we find an element as “closed” does not mean that we believe regulatory or court action is required.

4. Layered Analysis

In this section, we examine openness at each layer of our model. We also present a possible method for examining market related issues. The intention of this examination is not to exhaustively cover every technology at every layer, but to provide a number of examples to indicate how we might consider openness within each layer.

Unfortunately, this part of the analysis is still a work-in-progress. We will have it completed and available at the TPRC presentation.

5. Conclusion

In examining the issue of openness, we have tried not to advocate any particular degree of openness or to critique past commercial and regulatory decisions dealing with the topic. Rather, we have sought to explain and to offer a clearer, more unified and consistent definition of what constitutes openness. We did so in the context of the different levels of the protocol stacks that comprises modern data communications networks. We focused particular attention on the Internet suite of protocols (e.g., TCP/IP) and its relationship to the other layers. In undertaking this layer-based analysis, we assessed the “openness” by asking two questions: can the information be delivered and/or is there discrimination against the delivery of this information? Where applicable, we also identified and described recent changes in network architectures that affect the openness in different

layers. Changing commercial, technological, and regulatory developments may motivate such changes. For example, an otherwise open network may be closed or partially closed by the use of content filters deployed in response to security threats; by content filters designed to protect a user against spam; or by content filters designed to exclude a competitor's traffic. In this case, the choice may be prompted by sound security policies, by an individual's email preference, or by a competitive pressure. The point here is that the openness of a system may be compromised for various reasons.

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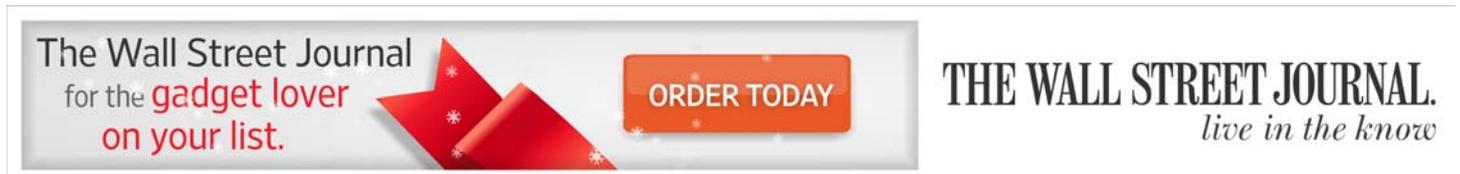
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www.webopedia.com/TERM/o/open_source.html - 06/27/2003

The advertisement features a white background with a red ribbon graphic on the left. The text reads: "The Wall Street Journal for the gadget lover on your list." To the right of the ribbon is an orange button that says "ORDER TODAY". On the far right, the Wall Street Journal logo is displayed with the tagline "live in the know".

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Cox About to Feel Wrath of Net Neutrality Activists

Amy Schatz reports on the Federal Communications Commission.

Activists concerned that Internet providers are secretly planning to muck about with the Internet and violate "net neutrality" principles got some good/bad news today, when another report surfaced about cable companies' blocking traffic.

As the [Associated Press noted](#), a German research team [has found](#) that Cox Communications also appears to be blocking or slowing some Internet traffic, similar to what Comcast Corp. is already under investigation by the FCC for doing.

Based on data provided by 8,000 volunteers who downloaded software to their PCs that simulate peer-to-peer file sharing software BitTorrent, the German researchers found that "most (573 of 599) U.S. hosts that observed blocking are located in Comcast and Cox networks." Researchers found that Comcast's blocking appeared to have at all times of the day, not just evening hours when networks would more likely be used more heavily.

Volunteers using DSL Internet (which is provided by phone companies) didn't show any problems and no other countries other than Singapore had significant blocking, the researchers found.

"Cox ensures the highest quality online experience for all our customers by using reasonable network management practices, which are explained in our [user policies](#)," the company said in a statement. "Cox allows the use of file-sharing and peer-to-peer services for uploads and downloads, and we allow access to all legal content, but we must manage the traffic impact of peer-to-peer services, as most ISPs do for the benefit of the customer."

"We have acknowledged that we manage peer-to-peer traffic in a limited manner to minimize network congestion," Comcast said in a written statement. "While we believe our current network management approach was a reasonable choice, we are now working with a variety of companies including BitTorrent and confirm our March announcement that we will move to a protocol-agnostic network management technique no later than December 31, 2008."

The FCC has already held two hearings about Comcast's alleged blocking and FCC Chairman **Kevin Martin** hasn't ruled out another.

"The FCC is always concerned about allegations that broadband consumers aren't able to reach any legal content on the Internet they choose," said **Rob Kenny**, an FCC spokesman. "If we receive any complaints of this nature, we will review them expeditiously."

Over at [Free Press](#), the non-profit advocacy group that filed one of the original complaints at the FCC about Comcast's alleged Internet traffic blocking, policy director **Ben Scott** said "We are considering our options and (filing a complaint) is definitely one of them."

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Detecting BitTorrent Blocking

Marcel Dischinger[†]

Alan Mislove^{†‡}

Andreas Haeberlen^{†‡}

Krishna P. Gummadi[†]

[†]MPI-SWS

[‡]Rice University

ABSTRACT

Recently, it has been reported that certain access ISPs are surreptitiously blocking their customers from uploading data using the popular BitTorrent file-sharing protocol. The reports have sparked an intense and wide-ranging policy debate on network neutrality and ISP traffic management practices. However, to date, end users lack access to measurement tools that can detect whether their access ISPs are blocking their BitTorrent traffic. And since ISPs do not voluntarily disclose their traffic management policies, no one knows how widely BitTorrent traffic blocking is deployed in the current Internet. In this paper, we address this problem by designing an easy-to-use tool to detect BitTorrent blocking and by presenting results from a widely used public deployment of the tool.

Categories and Subject Descriptors: C.2.3 [Computer-Communication Networks]: Network Operations; C.2.5 [Computer-Communication Networks]: Local and Wide-Area Networks; C.4 [Performance of Systems]

General Terms: Measurement, Performance, Experimentation

Keywords: BitTorrent, blocking, network measurement

1. INTRODUCTION

Access ISPs like residential cable and DSL providers are increasingly deploying middleboxes, such as traffic shapers, blockers, and firewalls, to monitor and manage their customers' traffic. These middleboxes classify and manipulate flows belonging to different applications according to ISP-specified policies [1, 2]. As traffic management policies are often driven by business interests (e.g., peering or transit agreements), many ISPs do not publicly disclose the details of their middlebox deployments. Thus, end users today may not know about the presence of the middleboxes, and often do not understand the impact of ISP traffic management policies on the performance of their applications.

Recently, it has been reported that certain access ISPs [3, 4] are surreptitiously blocking their customers from uploading data using the popular BitTorrent file-sharing protocol. The ISPs were found to tear down TCP connections identified as BitTorrent flows

by sending forged TCP reset (RST) packets to the end hosts. These reports of blocking sparked an intense and wide-ranging policy debate between ISPs, consumer advocacy groups, web site operators, and government agencies on acceptable ISP traffic management practices and network neutrality [5]. However, to date, end users lack access to measurement tools that can detect whether their access ISPs are blocking BitTorrent traffic. As a result, no one knows how widely BitTorrent is blocked in the current Internet.

In this paper, we present a large-scale measurement study of BitTorrent traffic blocking by ISPs. To conduct the study, we designed a tool called BTTest, which enables end users to test for blocking on their own access links. BTTest runs as a Java applet within the user's web browser; it emulates a BitTorrent flow to a server under our control, and it checks whether this connection is aborted with TCP reset packets that neither endpoint has sent. BTTest is *easy to use*, which enables us to gather data about a large number of ISP links. The test achieves *reproducible results* because it runs in a controlled environment, and its analysis is *conservative* in the sense that it checks for a very specific blocking technique, namely interrupting flows with forged connection reset packets.

We deployed BTTest on publicly accessible test servers and invited end users around the world to test their links. Over a period of 18 weeks, more than 47,300 end users in 1,987 ISPs world-wide ran BTTest. We examined the traces gathered during these tests for evidence of BitTorrent blocking. Our findings show that BitTorrent uploads are being blocked for a significant number of hosts, mostly from ISPs located in the USA and in Singapore. While our current study is limited to detecting BitTorrent blocking, it represents a first step towards the broader goal of making ISP policies more transparent to end users.

The rest of the paper is organized as follows. Section 2 provides an overview of the efforts by ISPs to shape BitTorrent traffic and discusses existing work related to detecting such behavior. Section 3 describes the design of our BTTest tool and the methodology used to gather traces at scale. In Section 4, we explain how BTTest analyzes the traces to detect BitTorrent blocking, and Section 5 presents the findings of our measurement study. We conclude in Section 6 with a discussion of open challenges and potential future work.

2. BACKGROUND AND RELATED WORK

BitTorrent [6] is a popular peer-to-peer file-sharing protocol, that accounts for a large and rapidly growing fraction of the data bytes sent over the Internet [7]. The resulting increase in Internet traffic is raising the cost of transit for ISPs, many of which are selling flat-rate plans with unlimited Internet access to their customers. Thus, it is not surprising that an ISP would implement strategies to reduce the amount of BitTorrent traffic generated by its customers.

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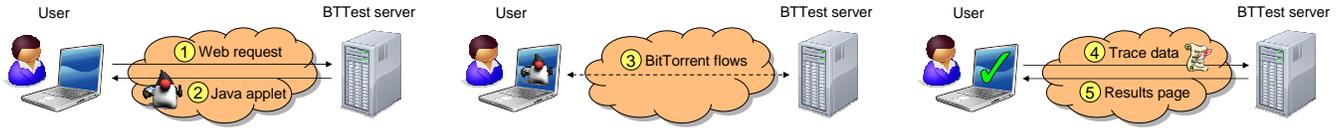


Figure 1: Overview of the BTTest system: (1) The user initiates the test. (2) The server sends her a Java applet. (3) The applet connects to the server and emulates a sequence of BitTorrent flows. (4) The applet informs the server whether any flows have been aborted. (5) The server analyzes the information from both endpoints and displays a result page.

Many ISPs are known to rate-limit the bandwidth consumed by BitTorrent traffic by deploying traffic shapers in their networks [2]. However, it has been discovered recently that some ISPs do not just rate-limit BitTorrent flows but block them outright [5] by injecting forged RST packets into the flows. When the end nodes of a BitTorrent transfer receive the RST packets, they immediately terminate the transfer.

The aggressive blocking of BitTorrent traffic by ISPs has been widely criticized, and it has generated significant interest in detecting BitTorrent traffic manipulation. While several systems have already been built to detect in-network BitTorrent blocking, they either require expert knowledge and specialized tools (which limits scalability), or they are based on high-level heuristics (which limits reliability). An example of the first category is the Electronic Frontier Foundation’s ‘Test Your ISP’ project [4], which offers instructions for tracing a BitTorrent transfer and checking for forged packets. This method requires access to two hosts in different ISPs and involves the use of tools like Wireshark, which is beyond the capabilities of most end users. An example of the second category is the network monitor plugin for the popular Azureus BitTorrent client [8], which reports the number of aborted connections. Since the plugin does not correlate observations from both endpoints of an aborted flow, it cannot reliably determine whether the RST packets were forged or sent by the other peer.

To our knowledge, BTTest is the first tool to offer highly specific, reliable blocking detection to a large number of end users.

3. MEASUREMENT METHODOLOGY

In this section, we first present the design of BTTest and then we describe how BTTest gathers traces of BitTorrent flows.

3.1 Design goals

The goal of BTTest is to detect whether a user’s BitTorrent traffic is being blocked. More specifically, we wanted to enable the user to answer the following three questions:

1. Is an ISP blocking BitTorrent flows with forged RST packets?
2. How is an ISP identifying BitTorrent flows? Is the identification based on port numbers, BitTorrent protocol messages, or both?
3. Does the blocking affect BitTorrent uploads, downloads, or both?

Note that we focus exclusively on BitTorrent blocking, and only on one specific technique, namely blocking with forged RST packets. We do *not* consider other forms of traffic manipulation, such as rate-limiting, message-dropping, or altering of the content. Detecting such a broad range of traffic manipulation practices is the subject of future work.

We wanted to deploy BTTest on a public web server and gather traces from end users around the world. Hence, another important

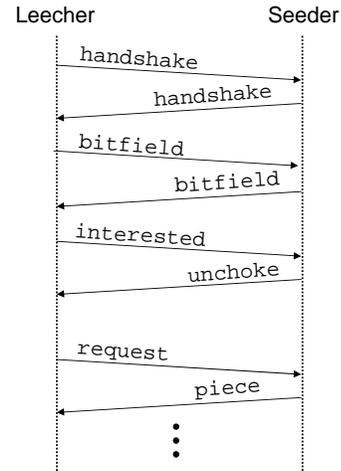


Figure 2: BitTorrent packet exchange in BTTest: The interaction always follows the same fixed script.

design goal for BTTest is that it should be very easy to use. Ideally, it should be as easy to use as the test sites for measuring Internet connection speeds [9].

3.2 BTTest overview

To detect whether BitTorrent flows are blocked, BTTest emulates a series of BitTorrent flows between the user’s host and a central BTTest server. During each flow, BTTest collects a packet trace, and it closely monitors both endpoints for any error conditions that might cause the flow to be aborted. If the flow is aborted without an apparent cause, BTTest checks the packet trace for additional control packets that were not sent by either of the endpoints. If such packets are found, BTTest reports this as evidence of blocking.

BTTest requires no special expertise and can be run from any machine that has a web browser with Java support. This ensures that it is available to a wide range of users. Figure 1 shows an overview of our prototype system. When a user visits the BTTest website and requests a measurement of her access link, a Java applet is downloaded to her web browser which connects¹ to our central BTTest server. This server is located in a network that is known not to block BitTorrent flows, so we can be sure that if any blocking is observed, it is performed on a link near the user’s host. The applet then emulates a sequence of BitTorrent flows and reports the results back to the server. Finally, the browser displays a results page, which reports whether any blocking was observed.

3.3 Emulating BitTorrent flows

BTTest emulates BitTorrent flows between end hosts and test servers, using the standard BitTorrent protocol [6]. The interaction always follows the same fixed script, which is shown in Figure 2.

¹To avoid problems with NAT and firewalls, the connection is always initiated by the user-side applet.

The flow can be either a downstream flow (in which data is transferred from the server to the user's host) or an upstream flow. In the following, we will refer to the sending endpoint as the *seeder*, which claims to already have all pieces of a file, and to the other endpoint as the *leecher*, which claims to have no pieces so far.

The leecher begins by exchanging a handshake message with the seeder. This is followed by an exchange of `bitfield` messages, which indicate the data segments that are available locally. Here, the seeder reports that it has all the segments, while the leecher reports that it has none. Next, the leecher sends an `interested` message to indicate that it wants to download segments, and the seeder grants it access by sending an `unchoke` message. During the remainder of the flow, the leecher downloads as many segments as it can; it repeatedly sends a `request` message to ask for a random segment, and the server returns a `piece` message that contains the segment. Since the content does not matter for our experiment, we fill each segment with random bytes.

3.4 BitTorrent test suite

To determine how ISPs identify BitTorrent traffic, BTTest actually runs multiple flows with different parameters. Specifically, it varies the following:

- **TCP port:** Half of the flows use port 6881, a well-known BitTorrent port. The others use port 4711, which is not associated with a specific protocol.
- **Direction:** Half of the flows transfer content downstream (from the server to the user's host), while the others transfer content upstream (from the user's host to the server).
- **Protocol:** Half of the flows contain real BitTorrent messages. The others contain messages of the same size and in the same order, but filled with random bytes.

BTTest runs each of the eight possible combinations twice, for a total of 16 test flows. Each BitTorrent flow lasts for ten² seconds, unless it is aborted earlier. Thus, the total number of bytes transferred depends on the available bandwidth on the path between the user's host and the server. By observing which of the tested flows are aborted, BTTest can infer how BitTorrent traffic is identified, i.e., which features actually trigger the blocking. The four test flows with random data over a non-BitTorrent port serve as a "sanity check"; they show whether the BTTest applet can communicate with our test servers at all.

3.5 Trace collection

For each emulated flow, BTTest collects two pieces of information: (1) On the server side a complete link-level packet trace (analogous to `tcpdump`), and (2) on the user side any Java exceptions the applet observed during the flow, including the point in the transfer where the connection was closed. We refer to these two items as a *result*, and to the set of all 16 results for a single host as a *result set*.

Ideally, BTTest would gather a packet trace on the user's host as well. However, there is no easy way to take such a trace from a Java applet running in a web browser, and in any case, administrator privileges (and thus a considerable amount of trust) would be required on most operating systems. Therefore, we had to find another way to determine whether the host had seen a connection reset from the server. Unfortunately, a connection reset manifests itself in Java as a generic `IOException`; the real cause is mentioned only in the string representation, which can vary between

²The flows are longer than strictly necessary because we also measure throughput. However, this data is not used in the present paper.

JVMs and between different languages. Our current prototype recognizes the most common strings directly and logs any other strings for further analysis.

4. TRACE ANALYSIS

We now describe the analysis BTTest performs on the gathered data, and we explain the types of blocking it can detect.

4.1 Sanitizing traces

As described in Section 3.4, BTTest tries to run a sequence of 16 flows between the user's host and the server. However, some hosts abort the test early or experience problems when running the applet. Therefore, BTTest only considers a result set when the following two conditions hold:

- **All 16 flows were tested and produced a result.** Result sets which do not contain results for all 16 tests are not considered in the results below. This can be caused by the user closing her web browser or browsing to another site, or by a crash of the applet.
- **All 4 TCP "sanity check" flows were able to send some data.** Result sets where at least one of the sanity check flows had no data packet ACKed (in the case of a download) or received (in the case of an upload) are discarded. This indicates the applet was unable to contact our web server, which could be caused by misconfigured NATs, firewalls, or Java applet security policies.

If either of these conditions are not met, BTTest reports an error to the user.

4.2 Identifying blocked flows

BTTest's goal is to detect whether middleboxes in the network are inserting forged RST packets to tear down BitTorrent flows. To detect these inserted packets, BTTest analyzes the server trace along with any Java exceptions seen by the user-side applet for each flow. A flow is considered to have been torn down by a forged RST packet only when *all* of the following three conditions hold:

- **An `IOException` with a specific set of messages was seen by our applet.** This indicates that an error was observed with the TCP connection on the user side. BTTest looks for the messages "Connection reset by peer" or "An existing connection was forcibly closed by the remote host" in the `IOException`, which indicate that the host has received a RST packet.
- **The server's packet trace contains at least one incoming RST packet.** This RST packet causes the connection to be torn down at the server.
- **The server's packet trace contains no outgoing RST packets before a FIN or RST packet was received.** Once the server receives a FIN or RST packet, the connection is torn down. Thus, any subsequent data packets received on the connection will be naturally responded to with RSTs.

The presence of all three conditions strongly indicates that a forged RST caused the flow to be torn down. The first two conditions indicate that a RST was received at both the server and the user's host. While we cannot say for sure that the user's host received a RST packet (as we do not have a packet-level trace from the host), we only look for `IOException`s with messages that are caused by the receipt of a RST packet. The third condition indicates that the server did not initiate the connection tear-down (in

other words, it received either a FIN or a RST before it sent any RSTs). Thus, BTTest detects forged RSTs by looking for flows (1) which were torn down by a RST received at the user’s host and/or server and (2) which contain no RSTs sent by the user’s host or the server before the connection was torn down.

4.3 Detecting BitTorrent blocking

We now describe how BTTest uses the information about blocked flows to detect BitTorrent blocking, and to infer how BitTorrent flows are identified by the middlebox. Our working hypothesis is that the identification could be based on three flow characteristics: the TCP port number of the flow, the BitTorrent messages in the flow, and the direction of the flow.

Recall that for each test, BTTest runs two identical flows, so it obtains two results. BTTest considers a test to have been affected by forged RSTs if either of the two flow results indicates forged RSTs. For simplicity, we call the test to have *failed* in this case; otherwise, we say that the test has *succeeded*.

BTTest then looks for BitTorrent blocking behavior by examining the result sets for each direction separately. If all tests in one direction using the BitTorrent ports fail regardless of whether BitTorrent data or random data was sent, BTTest reports *BitTorrent blocking based on BitTorrent ports* in that direction. If all the tests in one direction using the BitTorrent messages fail, regardless of the port on which the test runs, BTTest reports *BitTorrent blocking based on BitTorrent messages* in that direction.

4.4 Limitations

In its current form, BTTest can only detect a single form of traffic manipulation. It considers only BitTorrent traffic, and only blocking by injected control packets. BTTest currently does not look for traffic throttling, packet dropping, or packet manipulation. Extending BTTest to test for such additional behavior is the subject of future work.

Also, BTTest cannot determine at which point along the path the forged RST packets are generated. A typical Internet path between a host and our measurement servers is likely to cross multiple ISPs. BTTest cannot determine which ISP is responsible for tearing down BitTorrent connections. Developing techniques which use network tomography to pinpoint the location of the forged RST packets is the subject of ongoing work.

Finally, BTTest’s centralized architecture makes it possible for ISPs to avoid detection by whitelisting the BTTest servers. This is unlikely to have affected the data we present in this paper, but it may become a problem once BTTest is more widely known. We are currently working on a decentralized version of BTTest, which would make whitelisting by ISPs much more difficult.

5. RESULTS

In this section, we describe how we collected a set of traces from our public BTTest server, and we present results from our analysis of these traces.

5.1 Data set

We deployed BTTest on a publicly accessible web server at <http://broadband.mpi-sws.org/transparency/bttest.php>. Initially, we invited a handful of our colleagues and friends to test their ISPs, and we asked them to spread the invitation to their friends. After the first week, the site caught the attention of a few influential bloggers, and hundreds of new users tested their ISPs each day.

From March 18th to July 25th, 2008, our BTTest servers collected a total of 47,318 result sets from end users connected to 1,987 ISPs world-wide. 146 result sets did not contain results for

all 16 flows, and a further 17 failed to send data during at least one of the sanity-check flows. In these cases, BTTest reported an error to the user, so we removed these sets.

Some users ran our test multiple times. To avoid biasing our results, for each IP address, we considered only the first result set that passes the two conditions above, and we ignored all other result sets for that IP address. After removing the duplicate tests, we were left with 41,109 result sets.

We found evidence of BitTorrent blocking in 3,353 (8.2%) of the 41,109 result sets. In the rest of this section, we take a closer look at the hosts that observed blocking.

5.2 Where are the blocked hosts located?

First, we examined the countries in which hosts observed BitTorrent blocking. In total, our test was run from users in 135 countries. Most of our users came from North America (44.3%), Europe (26.7%), and South America (17.9%).

Table 1 lists all countries where we found BitTorrent blocking for at least one host. Our results indicate widespread BitTorrent blocking only for the USA and for Singapore. Interestingly, even within these countries, we observed blocking only for hosts belonging to a few ISPs.

Next, we looked at the ISPs whose hosts were affected by BitTorrent blocking. Overall, we found that hosts of 47 ISPs experienced blocking; the ISPs are listed in Table 1, along with the number of hosts we tested from each ISP and the number of hosts whose BitTorrent flows were blocked. The results show that not all hosts of these ISPs are affected by blocking.

We do not have enough data to determine why only some (but not all) hosts of an ISP are subjected to blocking, but there are several possible explanations. For example, the middleboxes that block BitTorrent transfers might not be deployed on all of an ISP’s network paths, or blocking might depend on the current load of the network. Also, some ISPs might allow BitTorrent traffic up to a certain threshold and apply the blocking to the “heavy hitters” only.

5.3 How do ISPs identify BitTorrent flows?

Next, we wanted to understand what flow properties ISPs were using to detect and block BitTorrent flows. We examined each of the three flow characteristics BTTest varies in the test suite, and we determined how many of the 3,353 result sets contained evidence of blocking based on these characteristics.

- **TCP port:** We found that only 530 (15.8%) of the result sets showed evidence of blocking based on BitTorrent ports, regardless of whether or not the flows actually contained BitTorrent messages. Thus, blocking of TCP connections based only on well-known BitTorrent ports seems to exist, but does not appear to be widespread.
- **Direction:** We found that 3,335 (99.5%) of the result sets contained evidence of blocking in the upstream direction, but only 71 (2.1%) of them contained evidence of blocking in the downstream direction. Thus, ISPs seem to be blocking primarily BitTorrent uploads and are rarely interfering with BitTorrent downloads.
- **Protocol:** Finally, we found that 3,293 (98.2%) of the result sets contained evidence of blocking based on BitTorrent messages. Thus, ISPs appear to be using deep packet inspection to block BitTorrent flows regardless of the port they are using.

In summary, the BitTorrent blocking we observed seems to be focused primarily on BitTorrent uploads, and it appears to affect

Country	ISP	# measured hosts	# blocked hosts
Australia	AARNet	2	1
Belgium	MAC Telecom	5	1
Brasil	Brasil Telecom	54	1
	PaeTec Comm.	9	1
Canada	RISQ	7	1
	Westman Comm.	4	3
China	China Telecom	49	2
Finland	Joensuun Elli	1	1
Germany	Uni Göttingen	1	1
Greece	OTENet	122	8
Hungary	DataNet	17	1
India	SonicWall	1	1
Ireland	IBIS	9	1
Jamaica	Terrenap	1	1
Kuwait	Wataniya Telecom	5	4
Malaysia	Telekom Malaysia	336	12
	Maxis Comm.	9	2
New Zealand	TelstraClear	22	1
Saudi Arabia	SaudiNet	8	1
Singapore	StarHub	156	101
South Korea	Korea Telecom	12	5
Spain	Telefonica	602	1
Taiwan	TANet	214	2
	Cheng Kung Univ.	11	2
	APOL	10	1
UK	Tiscali	354	2
	Comcast	4397	2574
	Cox	1004	508
	RoadRunner	2086	50
	Cablevision	646	1
	Suddenlink	123	4
	Mediacom Comm.	120	17
	Clearwire	34	9
	Midcontinent Comm.	21	13
	General Comm.	13	5
USA	Pavlov Media	11	2
	PaeTec Comm.	9	1
	PrairieWave	4	2
	UC Riverside	4	1
	Journey Comm.	3	1
	NHCTC	2	1
	Bergen.org	1	1
	DHL Systems Inc.	1	1
	Moric.org	1	1
	PSC	1	1
	The Shaw Group	1	1
	WSIPC	1	1

Table 1: The number of hosts with BitTorrent blocking grouped by country and ISP.

flows using the BitTorrent protocol regardless of whether or not they are using a well-known BitTorrent port.

5.3.1 Case study: Comcast

Our analysis found that most ISPs identify BitTorrent flows based on protocol messages. Presumably, the ISPs are using deep packet inspection to monitor the protocol messages exchanged and to decide whether a flow should be blocked. To understand the precise protocol messages that trigger blocking, we ran a controlled experiment using a Comcast host in Seattle, WA, to which we had access. In this experiment, we emulated BitTorrent transfers just as BTTest does, but we varied more aspects of the flows; for example, we obfuscated BitTorrent protocol messages by flipping bits, we left out some of the messages, and we changed the number of advertised pieces in the `bitfield` message to emulate different sharing scenarios, e.g., both peers having some but not all pieces of the file.

We found that, on this particular access link, BitTorrent uploads were blocked if and only if all of the following conditions hold:

- The server sent a valid BitTorrent handshake message,
- The Comcast host sent a valid `bitfield` message, and
- The Comcast host’s `bitfield` message indicated that it had all pieces.

In other words, the uploads of a file were blocked only when the Comcast host has finished downloading the file and was uploading it altruistically. However, the uploads were not blocked when the Comcast host was still missing some of the pieces of the file and thus, appeared to be interested in downloading. From this experiment, we conclude that the middleboxes which tear down BitTorrent connections maintain some per-flow state and inspect the packet payload for specific protocol messages.

Note that this case study only applies to Comcast. Unfortunately, we did not have access to hosts connected to other ISPs and were therefore unable run the same controlled experiment for them.

5.4 When do ISPs block BitTorrent flows?

ISPs that have admitted to blocking BitTorrent flows claim that they do so only during the hours of peak load, when their networks are congested. The data we collected with BTTest enables us to check whether blocking occurs continuously throughout the day or is limited to just a few hours of the day. For each hour of the day, we calculated the percentage of result sets that contained evidence of blocking. For each result set, we inferred the location of the tester and then computed the local time³ when the test had been performed. We then grouped together measurements from the same hour. Here we present data for Comcast and Cox because these are the two ISPs for which we had the most data points.

Figure 3 shows our results. While the number of measurements per hour shows a diurnal pattern with more measurements in the evening than in the early morning, the fraction of blocked tests shows no clear trend. We observed blocking for a significant fraction of the tests throughout the day. Figure 4 groups the result sets by day of the week instead. Again, there is no clear trend; we observed a significant fraction of blocked hosts on all days of the week. Finally, we used a Comcast host under our control in Seattle, WA, to run BTTest at 30-minute intervals for an entire week. We found that BitTorrent flows were constantly blocked during the entire week.

In conclusion, our data suggests that BitTorrent flows are being blocked independent of the time of the day or the day of the week.

5.5 At what stage are flows blocked?

Finally, we took a closer look at the BTTest packet traces to see at which stage of the BitTorrent protocol the blocking occurred. The RST packets can be injected at different points in a transfer, that is, at different stages of the BitTorrent protocol shown in Figure 2. To perform this analysis, we used the data reported by our user-side applet about the last message it sent before the connection was torn down.

In total, we identified four different places in the protocol at which connections were blocked. We found a very strong correlation in behavior across ISPs, and we observed mostly consistent behavior for hosts of the same ISP. Due to lack of space, we only give examples for each categories.

- **After the handshake message:** For Telekom Malaysia and Brasil Telecom we observed that the connection with

³We used an IP-to-geolocation tool to infer the timezone of each tester.

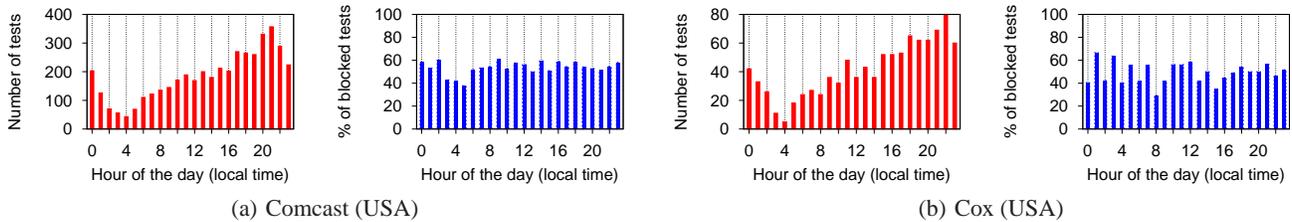


Figure 3: Result sets grouped by the hour of the day for Comcast and Cox: BitTorrent flows were blocked at all times of the day.

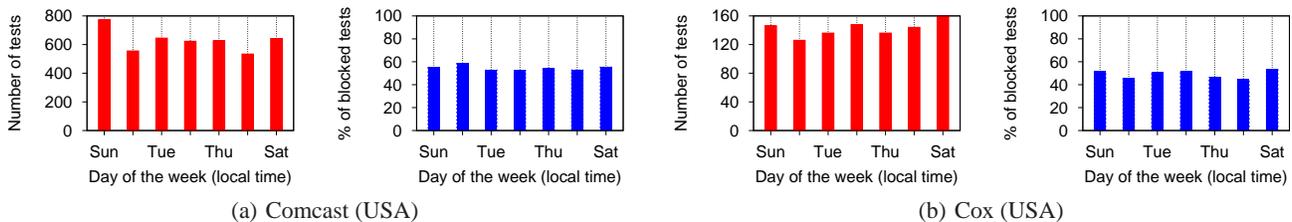


Figure 4: Result sets grouped by the day of the week for Comcast and Cox: Blocking occurred on every day of the week.

BitTorrent messages was torn down immediately after the handshake message was sent by the leecher.

- **After the `bitfield` message:** For StarHub, RoadRunner OTenet, and most other ISPs we observed connection tear-down for connections with BitTorrent messages after the leecher sent the `bitfield` message.
- **After the `interested` message:** For most Comcast and Cox hosts, we observed that the connections with BitTorrent messages were torn down after the `interested` message was sent by the leecher.
- **Later in the transfer:** Finally, for Comcast, Cox and Mediacom, we observed that connections with random data on BitTorrent ports were occasionally torn down later in the transfer. However, we were unable to determine a common pattern for the exact point where the connection was torn down.

While the types of blocking can sometimes vary even between hosts of the same ISP, we found that the basic characteristics of blocking were mostly consistent across hosts and even across some of the ISPs. Because of this, we suspect that many ISPs are using similar equipment for traffic identification and reset injection, e.g., the specialized hardware sold by Sandvine [1]. However, it is possible that these boxes are configured differently in different locations or at different times of the day.

6. CONCLUSION AND FUTURE WORK

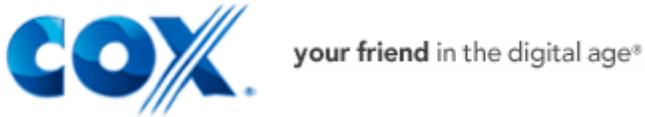
Recently published reports of access ISPs blocking BitTorrent transfers by injecting forged RST packets have sparked an international debate on network neutrality. In this context, the present paper makes two contributions. First, we presented the design of BTTest, a reliable and easy-to-use tool that allows end users to detect if BitTorrent traffic is being blocked on their access link. Second, we presented results from a large-scale measurement study that is based on a widely-used public BTTest deployment.

Our current study is limited to detecting BitTorrent blocking, and there are a number of open challenges and interesting directions for future work. First, it would be interesting to develop analysis techniques for detecting other types of traffic manipulation beyond blocking, e.g., BitTorrent traffic shaping. Second, the

centralized architecture of our BTTest tool limits scalability and is vulnerable to whitelisting by ISPs wishing to avoid detection. It would be useful to investigate ways to decentralize BTTest to allow the emulated BitTorrent transfers to be sent between testing peers. Finally, while our current methodology allows us to detect BitTorrent blocking along an Internet path, we cannot diagnose where along the path the traffic is being blocked, i.e., which ISP is responsible for blocking BitTorrent. A user could potentially localize the source of blocking by repeatedly running the test from servers located at different vantage points in the Internet. By correlating the blocking data obtained from multiple transfers along different Internet paths, one could hope to deduce which links are subject to BitTorrent blocking.

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Cox® High Speed Internet Acceptable Use Policy

Introduction

Updated 06/15/10

CoxCom, Inc. and its local affiliates and/or distribution partners (collectively "Cox") are pleased that you have chosen our High Speed Internet Service (the "Service"). Our goal is to provide you with an enriched, high-quality Internet experience. This Acceptable Use Policy (the "AUP") has been designed to protect our Service, our subscribers, and the Internet community from engaging in otherwise objectionable activities. Please read this policy prior to accessing the Service. All users of the Service must agree to these terms. **Violation of any term of this AUP may result in the immediate suspension or termination of either your Service and/or your Cox account.** This AUP should be read in conjunction with the Cox High Speed Internet Service Policy, and other applicable policies.

By using the Service, you agree to abide by, and require others using the Service via your account to abide by, the terms of this AUP. This AUP will be updated from time to time, so you should consult this document regularly to ensure that you are using the most recent version. **IF YOU DO NOT AGREE TO BE BOUND BY THESE TERMS, YOU SHOULD IMMEDIATELY DISCONTINUE YOUR USE OF OUR SERVICES AND NOTIFY THE COX CUSTOMER SERVICE DEPARTMENT SO THAT YOUR ACCOUNT CAN BE CLOSED.**

1. Prohibited Activities. Prohibited Activities. You may not use the Service in a manner that violates any applicable federal, state, or international law, order or regulation. Additionally, you may not use the Service to:

- Harm to Minors. You may not use the Service to harm or attempt to harm a minor, including, but not limited to, distributing, or transmitting child pornography or other material that is unlawful.
- Conduct, participate in, or otherwise facilitate, pyramid or other illegal soliciting schemes.
- Take part in any fraudulent activities, including impersonating any person or entity or forging anyone's signature.
- Invade another person's privacy, stalk, harass, or otherwise violate the rights of others.
- Post, transmit, or distribute content that is illegal, threatening, abusive, libelous, slanderous, defamatory, or otherwise offensive or objectionable.
- Restrict, inhibit, or otherwise interfere with the ability of any other person to use or enjoy their equipment or service without limitation, by posting or transmitting any information or software which contains a virus, lock, cancelbot, or other harmful feature.
- Access or use the Service with an IP address other than the dynamic Internet Protocol ("IP") address assigned to your computer through dynamic host configuration protocol ("DHCP"). You may not configure the Service or any related equipment with a static IP address or use any protocol other than DHCP.
- Modify any cable modem connected to the Cox network, regardless of whether the modem is owned by you, in order to commit theft of the Service, fraudulently use the Service or provide the Service to a third party, or to evade law enforcement if any such theft or fraud occurs.
- Modify the MAC address of any modem connected to the Cox network.
- Collect or store personal data about other users.

- Use an IP address not assigned to you by Cox.
- Violate any other Cox policy or guideline.
- Resell or redistribute the Service to any third party via any means including but not limited to wireless

2. Intellectual Property Infringement. You may not use the Service to post, copy, transmit, or disseminate patents, copyrights, trade secrets, trademark, moral rights, or propriety rights of any party. Cox assumes all risk regarding the determination of whether material is in the public domain, or may otherwise be used

3. User Content. You are solely responsible for any information that is transmitted from your IP address or other Internet services. You must ensure that the recipient of the content is appropriate and must take appropriate measures to protect minors from receiving inappropriate content. Cox reserves the right to refuse to post or to remove any information from the Service, in whole or in part, that Cox deems, in its sole discretion, to be illegal, offensive, indecent, or otherwise

4. Commercial Use. The Service is designed for personal, non-business related use of the Internet and related purposes. You may not resell the Service or otherwise make the Service available for use to persons outside your home (including through a wireless home network). You agree not to use the Service for operation as a de facto Internet service business enterprise (whether for profit or non-profit), including, without limitation, IP address translation or other services to provide additional access. For commercial Internet service please contact Cox Business Services.

5. Servers. You may not operate, or allow others to operate, servers of any type or any other device, equipment, or server-like functionality in connection with the Service, unless expressly authorized by Cox.

6. Misuse of Service. You may be held responsible for any misuse of the Service that occurs through your use of the Service, even if the misuse was inadvertent. You must therefore take precautions to ensure that others do not gain unauthorized access to the Service, including conduct in violation of this AUP.

7. Hacking/Attempted Unauthorized Access. You may not use the Service to breach or attempt to breach the security of any organization or person's computer, software, or data without the knowledge and consent of the owner of the equipment and the Service may not be used in any attempt to circumvent the user authentication or security of any account. This includes, but is not limited to, accessing data not intended for you, logging into or making use of any account not expressly authorized to access, or probing the security of other networks or computers for any reason other than that the network is designed for compromising security, such as password guessing programs, cracking tools, packet sniffers or other tools that are prohibited.

8. Security. You are solely responsible for the security of any device connected to the Service, including any equipment used to access the Service. You are responsible for implementing appropriate security precautions for all systems connected to the Service, such as viruses, spam, Trojan botnets, and other malicious intrusions. You are responsible for enabling the appropriate security settings on all networks connected to the Service. Any wireless network installed by the customer or a Cox representative that is not connected to the Cox network is prohibited. You authorize Cox to use technology to detect unsecured wireless networks connected to the Cox network in order to protect your use of the Service. If Cox determines that you are using the Service via an unsecured wireless network, you will be required to enable the Security on the WiFi device.

9. Disruption of Service. You may not disrupt the Service in any manner. You shall not interfere with core telecommunications services to any user, host or network, including, without limitation, denial of service attacks, denial of service, overloading a service, improper seizing and abuse of operator privileges or attempts to "crash" a host.

10. Viruses, Trojan Horses, Worms and Denial of Service Attacks. Software or other content downloaded from the Service may contain viruses and it is your sole responsibility to take appropriate precautions to protect your computer from damage to your data. You are prohibited from posting, transmitting or disseminating any information or software that contains a virus, spambot, worm or other harmful program or that generates levels of traffic sufficient to impede others' ability to use the Service. Prohibited conduct of this type includes denial of service attacks or similarly disruptive transmissions, as well as any other harmful or malicious features. We may suspend the Service if we detect a harmful program in order to protect the Service and stop the harmful program.

11. Electronic Mail. You may not use the Service to send bulk, commercial or unsolicited ("spam") email originating from any source, must not direct recipients to any website that is part of our Service, such as p resources that are part of the Service. The Service may not be used to collect responses from unsolicited other Internet hosts or email services that violate this Policy or the acceptable use policy of any other Inte "mail bombing," the sending of numerous copies of the same or substantially similar messages or very lar intent to disrupt a server or account, is prohibited.

You may not reference Cox in the header or body of an unsolicited email, or list an IP address that belong unsolicited email. Further, you may not take any action which implies that Cox is the sponsor of any unsol not sent through the Cox network. Further, forging, altering or removing electronic mail headers is prohibi

If the Service is disconnected, whether voluntarily or by termination, all user names and associated electr immediately released for reuse. Upon disconnection, any mailbox contents may be immediately deleted o Addresses and email may be held until Cox deletes them as part of its normal policies and procedures. TI retain or make any user name, email address or stored email retrievable once the Service is disconnected

12. Bandwidth, Data Storage and Other Limitations. Cox offers multiple packages of Service with vary bandwidth usage limitations (not all packages are available in all areas). You must comply with the curren electronic mail and other [Features and Limits of Service](#) that correspond with the package of Service you with the limitations for specific features, you must ensure that your activities do not improperly restrict, inh use of the Service, nor represent (in Cox's sole judgment) an unusually great burden on the network itself that your use does not improperly restrict, inhibit, disrupt, degrade or impede Cox's ability to deliver the S backbone, network nodes, and/or other network services. If your bandwidth usage exceeds the amount in Cox may suspend the Service or require you to upgrade the Service to a higher package and/or pay addit may terminate the Service after providing adequate notice and opportunity for you to modify your bandwic

13. Conflict. In the event of a conflict between the Subscriber Agreement and this AUP, the terms of the :

14. How to Contact Cox. For any questions regarding this AUP, complaints of violations, or cancellation one of the following:

- Email: abuse@cox.net
- Phone: See your invoice or [visit our Contact web page](#)
- U.S. Mail: See your invoice or [visit our Contact web page](#)

Subscriber Agreement

Introduction

Updated 07/01/2010

This Agreement (the "Agreement") sets forth the terms and conditions under which CoxCom, Inc. d/b/a C any Cox Communications affiliate and/or distribution partner (collectively, "Cox"), agrees to provide the C service (hereinafter the "Service") to you. By completing the registration and using the Service, you (i) agr using the Service via your account to abide by the terms of this Agreement, and (ii) represent and warrant age. If you do not agree with the foregoing, you may not use the Service and must return the installation s associated materials to Cox. This Agreement takes effect on the date on which you accept this Agreemen subscription is terminated.

Cox reserves the right to modify the terms of this Agreement or prices for the Service and may discontinue aspects of the Service in its sole discretion at any time by posting changes online. Your continued use of the Service after the posting of changes constitutes your acceptance of this Agreement as modified by the posted changes. The updated, posted version of this Agreement shall supersede any prior version of this Agreement that may have been included in any software or related materials. This Agreement should be read in conjunction with our Acceptable Use Policy, ("AUP"), Online Privacy Policy, and other policies.

IF YOU DO NOT AGREE TO BE BOUND BY THESE TERMS, YOU SHOULD IMMEDIATELY STOP THE SERVICE AND NOTIFY THE COX CUSTOMER SERVICE DEPARTMENT SO THAT YOUR ACCOUNT MAY BE CLOSED.

1. Your Subscription

Your subscription entitles you to use the Service. Your subscription is personal to you, you agree not to assign or sublicense your rights as a subscriber unless specifically allowed by this Agreement. You agree that you are responsible for any and all breaches of the terms and conditions of this Agreement, whether such breach results from your use or another using your computer. You agree to contact the local Cox office identified on your monthly invoice in the event of any change in the status of your account (e.g., change in individuals authorized to use your account) for account information.

2. Payment Terms

You agree to be responsible for any and all charges, damages and costs that you or anyone using your Computer use the Service. You agree to pay all monthly fees and installation charges including, but not limited to, applicable taxes, customer service fees, and collection fees. Monthly fees will be billed one month in advance. If payment is not received by the due date, late charges may be assessed and the Service may be terminated. You may incur charges including, without limitation, the purchase of "premium" services, such as additional web space, business class services, or access to certain services those billed by Cox. All such charges, including all applicable taxes, are your sole responsibility. You may be required to pay a fee and/or a security deposit in addition to all past due charges before the Service is reconnected.

3. Software License

Cox grants to you a limited, nonexclusive, nontransferable and nonassignable license to install and use the Licensed Software from third party vendors that Cox distributes, hereinafter referred to as the "Licensed Software"), in connection with the Service. Cox may modify the Licensed Software at any time, for any reason, and without providing notice. The Licensed Software constitutes confidential and proprietary information of Cox and Cox's licensors and contains other intellectual property protected under United States copyright laws, international treaty provisions, and other applicable laws. All rights in and to the Licensed Software, including associated intellectual property rights, are and shall remain with Cox. You agree to comply with the terms and conditions of all end user software license agreements accompanying the Licensed Software distributed by Cox in connection with the Service. You shall not translate, decompile, reverse engineer, copy, or otherwise dispose of the Licensed Software or any part thereof. You acknowledge that the Licensed Software and its documentation and/or technical information, is subject to applicable export control laws and regulations of the United States and may not be exported or re-exported to any countries that are subject to United States export control laws. Your right to use the Licensed Software terminates upon termination of this Agreement.

4. Computer and Equipment Requirements

At the time of initial installation of the Service, your computer equipment must comply with Cox's current network requirements that are available on <http://support.cox.com/>. The minimum computer requirements may change and Cox may require you to use support previously acceptable configurations; however, Cox is not obligated to continue to provide such support. You may use a cable modem from Cox or may purchase a DOCSIS-compliant, Cox approved cable modem from a third party. Cox reserves the right to provide service only to users with Cox-approved DOCSIS-compliant modems. You are strongly urged to contact Cox Customer Support or online at <http://support.cox.com/> for the most current Cox approved cable modem list and to ensure your approved equipment to the Cox network.

You will not remove any Cox owned equipment (the "Equipment") from the Premises or connect the Equipment to any other outlet to which the Equipment was initially connected by the Cox installer. Cox may relocate the Equipment to a new address at your request for an additional charge. If you relocate to a new address, this Agreement shall automatically terminate and you are required to enter into a new Agreement and may be charged a new installation fee to initiate Service. You

other than equipment authorized by Cox, to the cable modem outlet. You understand that failure to comply may cause damage to the Cox network and subject you to liability for damages and/or criminal prosecution. You may not damage the Equipment or the Service, or permit any other person to do the same that is not authorized by Cox.

5. Installation

You authorize Cox personnel and/or its agents to enter your premises (the "Premises") at mutually agreed times to maintain, inspect, repair and remove the Service. If you are not the owner of the Premises upon which the Service is provided, you represent and warrant that you have obtained the consent of the owner of the Premises for Cox personnel to enter the Premises for the purposes described above. You shall indemnify and hold Cox harmless from and against all claims, damages, losses and expenses, including reasonable attorneys' fees, arising out of the performance of this Agreement.

You acknowledge and agree that installation of the Service (including the Licensed Software) may require you to open your computer. You further acknowledge and agree that installation and/or use of the Service (including the Licensed Software) may result in the modification of your computer's systems files and that Cox may periodically update the Service to provide the Service. Cox neither represents, warrants, nor covenants that such modifications will not damage your computer. Cox shall have no liability whatsoever for any damage resulting from the installation and/or use of the Service or file modifications. Cox is not responsible for returning your computer to its original configuration prior to installation. Cox will supply and install certain software and, if required, an extra cable outlet, a cable modem and an Ethernet network card. Cox will also provide a "getting started guide" and online instructions on how to use the Service. Cox shall be responsible for getting the Service to full operational status, provided that your computer fulfills the minimum computer requirements for the Service. You may transfer the Licensed Software to additional computers within the home, but service and support for these additional computers and/or may incur an additional fee. Unless offered by Cox as a service, you agree that Cox has no responsibility for in-home networks. If you intend to transfer the software, you must give Cox prior notice of such transfer.

6. Acceptable Use Policy

You agree to use the Services strictly in accordance with the Acceptable Use Policy located at <http://www.cox.com/acceptableusepolicy> by Cox from time to time, and which is incorporated herein by reference and made a part of this Agreement.

7. Posting to Cox

You are solely responsible and liable for all material that you upload, post, email, transmit or otherwise make available on the Service, including, without limitation, material that you post to any Cox Website or the Web site of a Cox affiliate. You grant Cox the right to include material you submit or make available for inclusion on the Service. However, with respect to material you submit or make available for inclusion on publicly accessible areas of the Service, you grant Cox a world-wide, royalty free and non-exclusive license to use, copy, distribute, publish, transmit, publish your name in connection with the material, and to prepare derivative works. No compensation shall be made for the use of your material.

8. Links to Third Party Web Sites

In your use of the Service and/or Cox Web sites, you may encounter various types of links that enable you to access Web sites owned by third parties ("Third Party Site(s)"). These links are provided to you as a convenience and are not intended to be an endorsement of any Third Party Site by Cox. The inclusion of any link to a Third Party Site is not (i) an endorsement by Cox of the Third Party Site, (ii) any affiliation with its operators or owners, or (iii) a warranty of any type regarding any information or offer on the Third Party Site. The use of any Third Party Site is governed by the various legal agreements and policies posted at that Web site.

9. Monitoring and Removal of Content

Cox is under no obligation to monitor the Services. However, Cox reserves the right at all times and without notice to access to, or make unavailable, any content on its servers that it considers, in its sole discretion, obscene, defamatory, excessively violent, harassing, or otherwise objectionable, and to monitor, review, retain and/or disclose a copy of any such content to Cox's possession about or related to you, your use of the Services or otherwise as Cox deems necessary for law enforcement, regulation, legal process, or governmental request.

10. Privacy

You authorize Cox to make inquiries and to receive information about your credit history from others and to use such information in its decision regarding its provision of the Service to you. You agree that Cox may collect and disclose information about you to its service providers and other third parties.

use of the Service in the manner and for the purposes set forth herein and in Cox's Online Privacy Policy. Privacy Policy at <http://ww2.cox.com/aboutus/policies/your-privacy-rights.cox>

11. No Spam or Other Unsolicited Bulk Email

Cox may immediately terminate any subscriber account that it determines, in its sole discretion, is transmitted with any "spam" or other unsolicited bulk email. In addition, if actual damages cannot be reasonably calculated, liquidated damages of five dollars (U.S. \$5.00) for each piece of "spam" or unsolicited bulk email transmitted with your account. Otherwise you agree to pay Cox's actual damages, to the extent such actual damages exceed the liquidated damages. Cox reserves the right to block, reject or remove what it considers in its sole discretion to be "spam" or other unsolicited bulk email. Service and Cox shall have no liability for blocking any email considered to be "spam."

12. Termination and Surviving Obligations

Either party may terminate this Agreement at any time without cause by providing the other party with no less than 30 days written notice of such termination. In the event of termination by you, you must notify Cox by telephone or written submission. Email submissions shall not constitute effective notice. In the event of termination by Cox, Cox shall provide written notice of termination by electronic or other means. In those cases where you elect annual prepayment terms, you agree that the calculation of any refund for unused Service will be based upon the normal rate for the Service and not upon the prepayment rate.

You expressly agree that upon termination of this Agreement: (i) You will pay Cox in full for your use of any Service up to the later of the effective date of termination of this Agreement or the date on which the Service and any Equipment is disconnected and returned to Cox. You agree to pay Cox on a pro-rated basis for any use by you of any Service up to the end of a month. (ii) You will permit Cox to access your premises at a reasonable time to remove any Equipment owned by Cox. (iii) You will ensure the immediate return of any Equipment to Cox. You will return or destroy all copies of any data you pursuant to this Agreement. (iv) Cox is authorized to delete any files, programs, data and email messages stored on any account.

13. Disclaimer of Warranties and Limitation of Liability

You expressly agree that Cox is not responsible or liable for any content, act or omission of any third party that is threatening, defamatory, obscene, offensive, or illegal conduct, or any infringement of another's rights including but not limited to intellectual property rights, and you hereby release Cox for any such claims based on the activities of any third party. COX PROVIDES THE SERVICE TO YOU "AS IS" WITHOUT WARRANTY OF ANY KIND. NEITHER COX, NOR ITS AFFILIATES, SUPPLIERS OR LICENSORS, EMPLOYEES OR AGENTS WARRANT THE SERVICE WILL BE UNINTERRUPTED, SECURE, OR FREE FROM VIRUSES OR OTHER HARMFUL MALICIOUS AGENTS EVEN IF ANTI-VIRUS MECHANISMS ARE USED. COX DOES NOT WARRANT THAT ANY DATA OR ANY FILES SENT BY OR TO YOU WILL BE TRANSMITTED SECURELY, OR WITHIN A REASONABLE PERIOD OF TIME. ALL REPRESENTATIONS AND WARRANTIES OF ANY KIND, WHETHER IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY WARRANTIES OF TITLE, NON-INFRINGEMENT, MERCHANTABILITY, FITNESS FOR PURPOSE AND MERCHANTABILITY ARE HEREBY EXCLUDED AND DISCLAIMED. COX AND ITS EMPLOYEES, AGENTS AND REPRESENTATIVES ARE NOT LIABLE FOR ANY COSTS OR DAMAGES, ARISING DIRECTLY OR INDIRECTLY FROM THE INSTALLATION OR USE OF, THE LICENSED SOFTWARE, THE SERVICE (INCLUDING EQUIPMENT) FURNISHED BY COX, OR COX'S PROVISION OF TECHNICAL SERVICE AND SUPPORT FOR THE SERVICE. COX WILL NOT BE RESPONSIBLE FOR DAMAGE RESULTS FROM THE NEGLIGENCE OR GROSS NEGLIGENCE OF A COX INSTALLER, TECHNICAL SUPPORT REPRESENTATIVE, SERVICE REPRESENTATIVE, INCLUDING ANY INDIRECT, INCIDENTAL, EXEMPLARY, SPECIAL, PUNITIVE OR CONSEQUENTIAL DAMAGES REGARDLESS OF WHETHER OR NOT COX HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. COX'S CUMULATIVE LIABILITY TO YOU FOR ANY AND ALL CLAIMS RELATING TO THE USE OF THE SERVICE SHALL NOT EXCEED THE TOTAL AMOUNT OF SERVICE FEES PAID DURING THE IMMEDIATELY PRECEDING 12 MONTHS. YOU HEREBY RELEASE COX FROM ANY AND ALL OBLIGATIONS, LIABILITIES, AND CLAIMS IN EXCESS OF THE CUMULATIVE LIABILITY. COX IS ALSO NOT LIABLE FOR ANY COSTS OR DAMAGES ARISING FROM OR RELATED TO YOUR BREACH OF THIS AGREEMENT. The sole and exclusive remedies under this Agreement are as expressly set forth herein. Some states do not recognize the disclaimer of implied warranties, so the above exclusions or limitations may not apply to you.

14. Indemnifications

You agree to indemnify and hold Cox, its parents, subsidiaries, members, affiliates, officers and employees harmless from any demand, or damage, including costs and reasonable attorneys' fees, asserted by Cox or any third party due to or arising from the use of the Service.

or conduct on the Service. Cox will notify you within a reasonable period of time of any third party claim for indemnification and will afford you the opportunity to participate in the defense of such claim, provided the claim is conducted in a manner prejudicial to Cox's interests, as reasonably determined by Cox.

15. Management of Network

Cox is committed to the ongoing management of its network to improve its service offerings, protect customer privacy and feature enhancements for its CHSI subscribers. Network management may include, without limitation, throttling or limiting of email (as set forth in our email policies), rejection or removal of "spam" or otherwise unsolicited email, and other cybersecurity mechanisms (including identification and blocking of viruses, phishing sites and other malware), bandwidth usage, traffic prioritization and protocol filtering. Cox manages its network for the greatest benefit to its subscribers. The network management actions implemented by Cox may affect the performance of the Service. Cox strives to minimize any impact.

Cox may enforce limits on specific features of the Service including, without limitation, email storage (including un-checked email) and bandwidth allowances. Visit [Features and Limits of Services](#) to learn the limits on services.

16. Online Advertising

When you use the Service, Cox may display advertisements, public service announcements, and other messages. Cox may use your web surfing activity or other online behavior to determine the advertisements and other information displayed to you. Cox may be conducting a test of location-based advertising, which shows ads based on your geographic area and zip code. Visit [Advertising](#) for more information on Location-Based Advertising and instructions on opting out of this service.

17. Damage to and Encumbrances on Equipment, Computer, Software

If Equipment is leased or loaned to you by Cox the Equipment remains the property of Cox. You may not assign all or part of the Equipment to any third party. You agree to pay the full retail cost for the repair or replacement of unreturned, damaged, sold, transferred, leased, encumbered or assigned Equipment or part thereof, together with any other costs incurred by Cox in obtaining or attempting to obtain possession of any such Equipment. You hereby authorize Cox to bill you by the payment method authorized by you for any outstanding Service, Equipment, and repair and replacement of Equipment. At its option, Cox may install new or reconditioned Equipment, including swapping your existing equipment for Cox-owned equipment. You may incur a fee.

18. Copyright and Trademark Notices

Copyright © 1998 - 2010 Cox Communications, Inc. All rights reserved. Materials available on Cox Web site are the property of Cox Communications, Inc. Cox is a trademark of Cox Communications, Inc. Cox and other Cox services referenced herein are either registered trademarks or registered service marks of Cox, Inc. All other trademarks and service marks are the property of their respective owners.

19. Intellectual Property Infringement Claims

Cox is registered under the Digital Millennium Copyright Act of 1998. In accordance with Title 17, United States Code, if you believe that a Web page hosted by Cox is violating your rights under U.S. copyright law, you may file a claim of copyright infringement with Cox's designated agent. See Procedure for Making Claims of Copyright Infringement located at <http://ww2.cox.com/aboutus/policies.cox#copyright>

20. Governing Law and Jurisdiction

This Agreement is governed by the laws of the state in which your billing address in our records is located. Any court proceedings and arbitration must be in the county and state in which your billing address in our records is located.

21. Miscellaneous

This Agreement constitutes the entire agreement and understanding between the parties with respect to the Service and replaces any and all prior written or oral agreements. In the event that any portion of this Agreement is found to be unenforceable, that portion shall be construed in accordance with applicable law as nearly as possible to reflect the intent of the parties and the remainder of its provisions shall remain in full force and effect. Nothing contained in this Agreement shall limit Cox's rights and remedies available at law or in equity. Cox's failure to insist upon or enforce strict performance of this Agreement shall not be construed as a waiver of any provision or right. Neither the course of conduct between the parties nor business practice shall act to modify any provision of this Agreement. This Agreement may not be assigned or transferred without the prior written consent of Cox.

freely assignable by Cox to third parties.

22. How to Contact Us

For any questions regarding this Subscriber Agreement, billing or other, please contact Cox at one of the

Email: support@cox.net

Phone and U.S. Mail: See your invoice or visit <http://ww2.cox.com/> and check under "Contact Us"

Terms and Conditions

Updated 10/07/2009 (revision number 21)

IF YOU DO NOT ACCEPT THESE TERMS AND CONDITIONS DO NOT INSTALL AND/OR ACTIVATE

Subject to credit approval, Cox will provide all services that You, the Subscriber, request, on the following services are referred to as "Service" or "Services". If Cox provides telephone Service in Your area, such S the Cox telephone affiliate servicing Your area, and You will also be bound by that affiliate's tariff on file w authority and/or the tariffs or other terms of service located on Cox's website at www.cox.com/telephone. Internet Service, You will also be bound by the Cox High Speed Internet Subscriber Agreement, and the C located at www.cox.com or at another URL Cox may designate. The Services are also subject to the Anni each year, which contains, among other things, the Privacy Notice.

Cox's Obligations:

1. Install in a workmanlike manner, the Cox necessary equipment and materials.
2. Maintain Cox equipment in accordance with reasonable industry standards and applicable regulation
3. If available, You may subscribe to the Cox wiring maintenance plan, and Cox will install and/or main ("Internal Wiring"). Otherwise, Cox may have no responsibility for the maintenance of Your Internal \
4. Cox has no obligation or responsibility for loss of stored content on any devices or for any damage t

Your Obligations:

1. Pay all installation, equipment, service or other charges by due date of Cox's bill. Charges are accor tariff applicable at the time Services are rendered. Monthly service rates may be subject to additiona taxes, surcharges or other charges. Fees and charges are payable in advance once service is initia before the end of a prepaid period, Cox will refund the prorated unused portion of the fees and char is less than \$5.00, Cox will make the refund on Your request. If You or Cox terminate Service witho Cox may transfer outstanding balances for Services provided under this Agreement to other accoun
2. If You fail to make timely payment, Cox may terminate Service, remove Cox equipment and impose if applicable. Late fees and collection trip fees will not exceed the maximum amount permitted by law
3. Provide Cox's employees and representatives with a safe working environment.
4. Assume complete responsibility for improper use, damage or loss of any equipment furnished by Co equipment and Services in accordance with the Cox terms and conditions and in a manner that com regulations. If You use the Services or equipment in a manner that violates the Cox terms and condi regulations, then Cox shall have the right to immediately restrict, suspend, or terminate your Service Cox.
5. Allow Cox access into Your premises to install, maintain or repair, upgrade (if any), and remove Cox Cox identification you may request and examine. If You are not home at the time of a service call, Y resident or guest at Your residence to grant Cox access to Your premises.
6. Any attempted assignment or transfer of the Services to any other tenant or occupant or to any othe

written consent is prohibited and is a breach of this Agreement.

7. If You do not own Your premises: (i) You represent that You have obtained necessary permission from the owner for the installation and provision of the Services; and (ii) claims of the owner in connection with the installation and provision of the Services.
8. Cox may provide a modem with backup battery power for telephone service that requires a telephone service. That modem will remain the property of Cox and must be returned upon disconnection. If there is a power outage, your telephone Service will continue to operate for up to eight hours with the backup power. If Cox does not provide a modem or backup battery power for Cox Services utilizing a telephone cable modem, you will remain your responsibility in all respects. If (i) the modem that supplies your telephone Service is inoperable, (ii) the backup battery is not charged or otherwise becomes inoperable, or (iii) there is an extended power outage, including access to E911, will not be available. Cox uses your telephone Service address to identify your location. To ensure that E911 dispatch receives your correct address, the telephone modem should not be moved. You must notify Cox in advance if you would like to move or relocate your telephone Service.

Equipment: All Cox Equipment and embedded Software (Equipment) provided to You by Cox or its agents. Cox shall have the unrestricted right, but not the obligation, to install or modify the software in any of the Equipment for You to copy, duplicate, reverse engineer or in any way tamper with or interfere with any Software provided to You. You agree:

1. To use the Equipment only for receiving Services ordered from or through Cox. You will only use an equipment for the receipt of Cox video Services.
2. To promptly return the Equipment to Cox in good condition and without any encumbrances, except for those resulting from proper use, immediately upon discontinuance of Service.

If You do not promptly return the Equipment or if it is damaged or encumbered, ("Unreturned Equipment") it will be difficult to ascertain. Therefore, You agree to pay, and Cox may charge Your account, a liquidated damages amount based on reasonable estimates of the replacement costs and incidental costs that Cox incurs; provided, however, that the maximum amount permitted by law (the "Unreturned Equipment Charge"). This provision and any other provisions in this Agreement should survive the termination or expiration of this Agreement.

Programming: You acknowledge that Cox reserves the right at any time and in its sole discretion to charge for pre-empt specific programs or parts of programs previously advertised as available. Cox also reserves the right to terminate service upon notice to You. You may immediately terminate service upon notice to Cox. You may not rebroadcast or charge admission to view or listen to any of the programming made available by the Services unless you have obtained the necessary performance licenses.

LIMITATION OF WARRANTIES AND LIABILITY: COX, ITS PARENT, AFFILIATES, EMPLOYEES, (COLLECTIVELY, THE "COX GROUP") MAKE NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AS TO THE SERVICES PROVIDED. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF WARRANTIES, SO THESE PROVISIONS MAY NOT APPLY TO YOU. THE COX GROUP SHALL NOT BE LIABLE FOR FAILURE TO FURNISH, OR THE DEGRADATION OR INTERRUPTION OF ANY SERVICES, FOR ANY CONTENT, IDENTITY THEFT, FOR ANY FILES OR SOFTWARE DAMAGE, REGARDLESS OF CAUSE. COX SHALL NOT BE LIABLE FOR DAMAGE TO PROPERTY OR FOR INJURY TO ANY PERSON ARISING FROM THE MAINTENANCE OR REMOVAL OF EQUIPMENT, SOFTWARE, WIRING OR THE PROVISION OF SERVICES. COX SHALL NOT BE LIABLE FOR FAILURE TO PROVIDE SERVICE IF THE CAUSE IS DUE TO THE ACTS OF A THIRD PARTY. YOU SHALL INDEMNIFY AND HOLD HARMLESS THE COX GROUP FROM ANY CLAIMS, ACTIONS, PROCEEDINGS, DAMAGES, LOSSES AND LIABILITIES, INCLUDING ATTORNEYS' FEES, ARISING OUT OF (I) SUCH DAMAGE OR INJURY RESULTING FROM YOUR USE OF THE SERVICE INFRINGES ON THE PATENT, COPYRIGHT, TRADEMARK OR OTHER INTELLECTUAL PROPERTY RIGHT OF ANY THIRD PARTY, (II) ANY BREACH OR ALLEGED BREACH BY YOU OF THE SERVICE TO PERSON OR PROPERTY RESULTING FROM YOUR NEGLIGENCE. UNDER NO CIRCUMSTANCES SHALL COX BE LIABLE FOR ANY INCIDENTAL, INDIRECT, PUNITIVE, SPECIAL OR CONSEQUENTIAL DAMAGES.

TOTAL LIABILITY TO YOU ARISING UNDER THIS AGREEMENT SHALL BE LIMITED TO THE AMOUNT IN THE TWELVE MONTHS PRECEDING YOUR CLAIM.

Breach of Agreement: If You breach this Agreement, or any other agreement referenced herein, Cox has the right to suspend Your Agreement and retrieve its equipment. Cox's failure to require Your strict performance of any term of this Agreement does not affect Cox's right to require strict performance of any term or condition herein.

Entire Agreement: This Agreement, any applicable tariffs and other agreements specifically referenced herein constitute the entire agreement between Cox and You for the subject matter hereof. Only Cox may make modifications to this Agreement. The unenforceability of any term of this Agreement shall not affect the validity or enforceability of any other provision of this Agreement.

Price Lock Guarantee Agreement

View the following policies regarding the Cox Price Lock Guarantee and Monthly Discounts:

- [24 Month Price Lock Guarantee](#)
- [24 Month Price Lock Guarantee](#) – Arkansas, Arizona, Connecticut, Kansas, Louisiana, Oklahoma, Florida
- [24 Month Price Lock Guarantee](#) – Las Vegas (Retired)
- [12 Month Price Lock Guarantee](#) – Connecticut and Rhode Island
- [24 Month Price Lock Guarantee and Monthly Discount](#) (Retired)

Procedure for Making Claim of Copyright Infringement

Updated 2006

Pursuant to the Digital Millennium Copyright Act (the "DMCA"), you may file a Notification of claimed infringement with a Designated Agent of a Service Provider if you believe that a Web page hosted by the Service Provider is violating your copyright. (See Title 17, United States Code, Section 512(c)(3)). The DMCA provides the following procedure for filing a Notification of claimed infringement with a Service Provider.

To serve a Notification on Cox[®] Business; Cox[®] High Speed InternetSM; and/or Cox Interactive MediaSM,

Name of Designated Agent to Receive Notification: DMCA Agent

Address to Which Notification Should be Sent: 1400 Lake Hearn Drive, NE, Atlanta, Georgia 30319

Telephone Number of Designated Agent: (404) 269-6830

Facsimile Number of Designated Agent: (404) 269-8432

Email Address of Designated Agent: abuse@cox.net

Notification:

In order to be effective under the DMCA, the Notification must (i) be in writing, and (ii) be provided to the Designated Agent of the Service Provider.

In order for such a complaint to be effective under the DMCA, Notification must include the following:

1. A physical or electronic signature of a person authorized to act on behalf of the owner of an exclusive right that is allegedly infringed.
2. Identification of the copyrighted work claimed to have been infringed, or, if multiple copyrighted works are covered by a single Notification, a representative list of such works at that site.
3. Identification of the material that is claimed to be infringing or to be the subject of infringing activity and information reasonably sufficient to permit the Service Provider to locate the material, and information reasonably sufficient to permit the Service Provider to disable access to which is to be disabled, and information reasonably sufficient to permit the Service Provider to contact the complaining party, such as a telephone number, and if available, an electronic mail address at which the complaining party may be contacted.
4. Information reasonably sufficient to permit the Service Provider to contact the complaining party, such as a telephone number, and if available, an electronic mail address at which the complaining party may be contacted.
5. A statement that the complaining party has a good faith belief that use of the material in the manner in which it is being claimed to infringe or to engage in infringing activity is not authorized by the copyright owner, its agent, or the law.
6. A statement that the information in the Notification is accurate, and under penalty of perjury, that the notifying party is authorized to act on behalf of the owner of an exclusive right that is allegedly infringed.

Upon receipt of the written Notification containing the information described in 1 through 6 above, Service Provider shall:

1. Remove or disable access to the material that is alleged to be infringing.
2. Take reasonable steps to promptly notify the subscriber that it has removed or disabled access to the material.

Counter Notification:

If a notice of copyright infringement has been filed against you, you may file a Counter Notification with a Designated Agent. In order to be effective, a Counter Notification must be written and include substantially the following information:

1. A physical or electronic signature of the subscriber.
2. Identification of the material that has been removed or to which access has been disabled and the location where the material appeared before it was removed or access to it was disabled.
3. A statement under penalty of perjury that the subscriber has a good faith belief that the material was not the subject of copyright infringement, or that the removal or disabling of access to the material was a mistake or misidentification of the material to be removed or disabled.
4. The subscriber's name, address, and telephone number, and a statement that the subscriber consents to the jurisdiction of the District Court for the judicial district in which the address is located, or if the subscriber's address is in more than one judicial district in which the Service Provider may be found, and that the subscriber will accept service of process by the Service Provider or an agent of such person.

Upon receipt of a Counter Notification containing the information as outlined in 1 through 4 above, Service Provider shall:

1. Promptly provide the complaining party with a copy of the Counter Notification;
2. Replace the removed material or cease disabling access to the material within 10 to 14 business days of receipt of the Counter Notification, unless the Service Provider's Designated Agent first receives notice from the copyright owner or its agent that a court order has been filed seeking a court order to restrain the alleged infringing party from engaging in infringing activity on the Service Provider's system or network.

NOTE: Under the DCMA, claimants who make misrepresentations concerning copyright infringement may be liable for the removal or blocking of the material, court costs, and attorneys fees. See Title 17, United States Code, Section 512(f).

NOTE: The information on this page is provided to you for informational purposes only, and is not intended to constitute an offer of legal advice. If you believe your rights under U.S. Copyright law have been infringed, you should consult an attorney.

Cox Policies

- **Site Policies**
- [Online Privacy Policy](#)
- [California Privacy Rights](#)
- [Visitor Agreement](#)

- **Residential Customers**
- [Annual Privacy Notice](#)
- [Terms and Conditions](#)
- [Price Lock Guarantee Agreement](#)
- **Residential Internet Service**
- [Acceptable Use Policy](#)
- [Subscriber Agreement](#)
- **Residential Telephone Service**
- [Customer Agreement](#)
- **Residential Wireless Service**
- [Customer Agreement](#)
- **Business Customers**
- [Annual Privacy Notice](#)
- **Business Data Services**
- [Acceptable Use Policy](#)
- **Business Voice Services**
- [Customer Telephone Agreement](#)
- [VoiceManager Terms & Conditions](#)
- **Operations Policies**
- [Procedure for Claim of Copyright Infringement](#)
- [Law enforcement and subpoenas information](#)
- [Leased access information](#)

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[Terms of Service/Policies](#)

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PLEASE READ AND REVIEW THIS DOCUMENT CAREFULLY BEFORE ACCESSING FURTHER INFORMATION ON THIS WEB SITE. BY PROCEEDING TO ACCESS THIS WEB SITE, YOU AGREE TO BE BOUND BY THE TERMS AND CONDITIONS SET FORTH BELOW. IF YOU DO NOT WISH TO BE BOUND BY THESE TERMS AND CONDITIONS, PLEASE DO NOT ACCESS OR USE THIS WEB SITE. CHARTER COMMUNICATIONS ("CHARTER") MAY MODIFY THIS AGREEMENT AND ITS TERMS AND CONDITIONS, AND SUCH MODIFIED AGREEMENT SHALL BE EFFECTIVE IMMEDIATELY UPON POSTING. YOUR CONTINUED ACCESS TO OR USE OF THIS SERVICE SHALL BE DEEMED YOUR CONCLUSIVE ACCEPTANCE OF THE AGREEMENT AND ITS TERMS AND CONDITIONS AND ANY MODIFICATIONS THERETO.

PLEASE READ THIS ACCEPTABLE USE POLICY PRIOR TO ACCESSING THE SERVICE. THE WORD CUSTOMER IS USED HEREIN TO REFER TO ANY PERSON, ENTITY OR BUSINESS ORGANIZATION THAT SUBSCRIBES TO THE SERVICE. BY USING THE SERVICE, CUSTOMER AGREES TO THE TERMS OF THIS ACCEPTABLE USE POLICY. CHARTER RESERVES THE RIGHT TO IMMEDIATELY TERMINATE THE CUSTOMER'S SERVICE WITHOUT NOTICE, AT CHARTER'S SOLE DISCRETION, IF CUSTOMER OR OTHERS WHO USE CUSTOMER'S SERVICE, VIOLATE THIS ACCEPTABLE USE POLICY. CHARTER ALSO RESERVES THE RIGHT TO IMMEDIATELY REMOVE ANY MATERIAL OR INFORMATION THAT VIOLATES THIS POLICY FOR ANY REASON WHATSOEVER AT CHARTER'S SOLE DISCRETION WITHOUT PRIOR NOTICE.

1. USE

The commercial high-speed Internet access service provided to the Customer is being provided solely for use in Customer's business and any unauthorized access by a third party to e-mail, Internet access, or any other function of the Service is in violation of this Policy and relieves Charter of any affirmative obligations it may have.

Customer will not resell or redistribute, nor allow others to resell or redistribute, access to the Service in any manner, except as expressly provided in any contract for service. The limitation on resale or redistribution of access includes, but is not limited to, hosting applications such as the provision of e-mail, FTP and Telnet access.

Charter reserves the right to disconnect or reclassify the Service for failure to comply with any portion of this provision or this Policy.

Any violation of these policies may lead to prosecution under state and/or federal law and/or termination of Customer's Service.

2. END USERS

Customer is responsible for ensuring that all end users of the Service comply with this AUP. Charter may disconnect Service if an end user violates this AUP. The Customer must make contact information publicly available, and must respond in a timely manner to any complaints. Charter shall consider any complaints regarding the Customer's end users to apply to the Customer. Customer is responsible for any and all e-mail addresses associated with the Customer's account.

The Customer is responsible for any misuse of the Service, whether by authorized or unauthorized end users. Therefore, the Customer must take steps to ensure that others do not gain unauthorized access to the Service. Customer is solely responsible for the security of (i) any device Customer chooses to connect to the Service, including any data stored or shared on that device and (ii) any access point to the Service.

If the Customer sells or resells advertising or web space to a third party, then the Customer will be responsible for the content of such advertising or on such web space and the actions of such third party.

3. NO ILLEGAL OR FRAUDULENT USE

Customer will not use, nor allow others to use, the Service to violate any applicable federal, state, local or international laws (including, but not limited to, the Children's Online Privacy Protection Act). Customer will not use, nor allow others to use, the Service to commit a crime, act of terrorism, or fraud, or to plan, encourage or help others to commit a crime or fraud, including but not limited to, acts of terrorism, engaging in a pyramid or ponzi scheme, or sending chain letters.

4. NO COPYRIGHT OR TRADEMARK INFRINGEMENT

Customer will not use, nor allow others to use, the Service to send or receive any information which infringes the patents, trademarks, copyrights, trade secrets or proprietary rights of any other person, entity or business organization. This includes, but is not limited to, digitization of music, movies, photographs or other copyrighted materials or software.

Charter is registered under the Digital Millennium Copyright Act of 1998 (DMCA). Under the DMCA, copyright owners have the right to notify Charter if they believe a Charter customer has infringed the copyright owner's work(s). If Charter receives a notice from a copyright owner alleging a Customer has committed copyright infringement, Charter will notify the Customer of the alleged infringement. If Charter receives more than one notice alleging copyright infringement on the Customer's part, Customer may be deemed a "repeat copyright infringer." Charter reserves the right to terminate the accounts and access to the Service of repeat copyright infringers.

5. NO THREATS OR HARASSMENT

Customer will not use, nor allow others to use, the Service to transmit any material that threatens or encourages bodily harm or destruction of property or which harasses, abuses, defames or invades the privacy of any other person or entity.

6. NO HARM TO MINORS

Customer will not use, nor allow others to use, the Service to harm or attempt to harm a minor, including but not limited to using the Service to send pornographic, obscene or profane materials.

[FIND DEALS](#)

7. NO "SPAMMING"

Customer will not use, nor allow others to use, the Service to send unsolicited messages or materials, bulk e-mail, or other forms of solicitation ("spamming"). Charter reserves the right, in Charter's sole discretion, to determine whether such posting or transmission constitutes unsolicited messages or materials. This prohibition against spamming is applicable to mass mailings by Customers in conjunction with third parties and is designed to maintain Service quality for all Customers. Mass mailings are those sent to more than 150 recipients by Customer or in conjunction with a third party to any group of recipients. Customer is responsible for maintaining confirmed opt-in records and must provide them to Charter upon request. The term "opt-in" means that recipient has signed up for mailings voluntarily.

8. NO "HACKING"

Customer will not use, nor allow others to use, the Service to access the accounts of others or to attempt to penetrate security measures of the Service or other computer systems ("hacking") or to cause a disruption of the Service to other on-line users. Customer will not use, nor allow others to use, tools designed for compromising network security, such as password-guessing programs, cracking tools, packet sniffers or network probing tools.

9. NO SYSTEM DISRUPTION

Customer will not use, nor allow others to use, the Service to disrupt Charter's network or computer equipment owned by other Charter customers. Any static IP address must be authorized and provisioned by Charter. Customer also agrees that Customer will not use, nor allow others to use, the Service to disrupt other Internet Service Providers or services, including but not limited to e-mail bombing or the use of mass mailing programs.

10. NO IMPERSONATION OR FORGERY

Customer will not impersonate, nor allow others to impersonate, another user, falsify one's user name, company name, age or identity in e-mail or in any post or transmission to any newsgroup or mailing list or other similar groups or lists. Customer will not, nor allow others to, forge any message header of any electronic transmission, originating or passing through the Service.

11. NO ABUSE OF NEWSGROUPS

Customer will not post, nor allow others to post, a similar item to more than six (6) newsgroups or mailing lists. Customer will not, nor allow others to, post or transmit any private, third party e-mail to any newsgroup or mailing list without the explicit approval of the sender.

12. NO EXCESSIVE USE OF BANDWIDTH

If Charter determines, in Charter's sole discretion, that Customer is using an excessive amount of bandwidth over the Charter network infrastructure for Internet access or other functions using public network resources, Charter may at any time and without notice, suspend excessive bandwidth capability, suspend Customer's access to the Service, require Customer to pay additional fees **FIND DEALS** accordance with Charter's then-current, rates for such service, or terminate Customer's account.

13. NO "VIRUSES"

Customer will not use, nor allow others to use, the Service to transmit computer "viruses," worms, "Trojan horses" or other harmful software programs. Customer will use standard practices to prevent the transmission of such viruses or other harmful software.

14. NO WAIVER

The failure by Charter or its affiliates to enforce any provision of this AUP shall not be construed as a waiver of any right to do so at any time.

15. REVISIONS TO POLICY

Charter reserves the right to update or modify this Policy at any time and from time to time with or without prior notice. Continued use of the Service will be deemed acknowledgment and acceptance of the policy. Notice of modifications to this Policy may be given by posting such changes to Charter's homepage www.charter.com, by electronic mail or by conventional mail.

Acceptable Use Policy, Version 4.1

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**Before The
FEDERAL COMMUNICATIONS COMMISSION
445 12th Street, S.W., Washington, DC 20554**

In the Matter of)

The State Of Mobile Wireless Competition)

WT Docket No. 10-133

COMMENTS OF AT&T INC.

David L. Lawson
James P. Young
Christopher T. Shenk
SIDLEY AUSTIN LLP
1501 K Street, N.W.
Washington, D.C. 20005
202-736-8088

Michael P. Goggin
Gary L. Phillips
Paul K. Mancini
AT&T Inc.
1120 20th Street, N.W.
Washington, D.C. 20036
202-457-2055

Attorneys for AT&T Inc.

July 30, 2010

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The State Of Mobile Wireless Competition)

WT Docket No. 10-133

COMMENTS OF AT&T INC.

Pursuant to the Public Notice (“*Notice*”) released by the Wireless Telecommunications Bureau (“Bureau”) on June 30, 2010,¹ AT&T Inc. (“AT&T”) submits the following comments.

INTRODUCTION AND SUMMARY

The Commission’s Fourteenth Annual Wireless Competition Report² reads as a search for the dark lining in a silver cloud. The great bulk of the Report lays out an enormous array of facts that confirm a vibrantly competitive wireless marketplace: falling prices, expanding output, substantial new entry, unprecedented options for consumers, rapid, breathtaking innovation, and tens of billions of dollars of new investment even in the midst of an historic economic downturn. Inexplicably, however, the *Fourteenth Report* refuses to draw the obvious conclusion of the Commission’s past six annual wireless reports: that the wireless marketplace is characterized by “effective competition.”³

Looking past a veritable mountain of direct evidence that U.S. mobile wireless consumers

¹ Public Notice, *The State Of Mobile Wireless Competition*, WT Docket No. 10-133 (rel. June 30, 2010) (“*Notice*”).

² Fourteenth Report, *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services*, WT Docket No. 09-66, FCC 10-81 (rel. May 20, 2010) (“*Fourteenth Report*” or “*Report*”).

³ 47 U.S.C. § 332(c).

are reaping the benefits of a marketplace that is characterized by vigorous competitive rivalry – with providers constantly one-upping each other to offer consumers expanded and improved choices and more for less – the *Fourteenth Report* instead ballyhoos a series of indirect calculations that it suggests may be harbingers of doom.

The supposedly negative signs highlighted in the *Fourteenth Report's* executive summary and press release are, in fact, nothing of the sort. In some cases, such as the suggestions that provider investment and advertising are declining, the *Fourteenth Report* simply has the facts wrong. In other cases, such as the “weighted average” HHI concentration in the world’s *least* concentrated wireless marketplace, the *Fourteenth Report* leaps to conclusions that would not be supported by its calculations even if they had been performed correctly (and they were not). And, in still other cases, such as “EBITDA” accounting “profitability,” the *Fourteenth Report* itself acknowledges that no economically meaningful conclusions can be drawn from the variations between providers that it cites. Of course, none of this number-crunching can erase the directly observable market performance and, in the end, the *Fourteenth Report* attempts to shift attention entirely away from the congressional inquiry whether competition is “effective” (as it clearly is) under the theory that, no matter how effective the competition, “there are policy levers that can be used to produce superior outcomes.”⁴

This conspicuous refusal to acknowledge effective wireless competition is not merely an academic issue – it is doing real harm. By leaving the impression that the Commission may impose regulatory “solutions” in the absence of *any* real market problems, the *Fourteenth Report* undeniably exacerbates regulatory uncertainty and discourages new infrastructure investment – a

⁴ *Fourteenth Report* ¶ 16 (quoting *Ex Parte* Submission of the U.S. Dep’t. of Justice, GN Docket No. 09-51, at 11 (filed Jan. 11, 2010) (“DOJ 1/4/10 *Ex Parte*”).

particular concern given that broadband investments “are very long term in nature.”⁵ The Report quotes the Justice Department as endorsing its search for wireless “policy levers,” but the quoted passage had nothing to do with the wireless marketplace in which the Department has consistently supported deregulatory policies.⁶

The Commission should not continue down this counterproductive path in the *Fifteenth Report*. The Commission has a well-established, four-part mode of inquiry for determining whether wireless competition is “effective”: it examines market structure, market performance, provider conduct, and consumer behavior. As the remainder of these comments shows, the *Fourteenth Report* should have found that each of these measures strongly supported a finding of effective competition, and more recent developments even more strongly support such a finding in the *Fifteenth Report*.

The U.S. wireless industry structure all but guarantees the intensely competitive performance that is so readily observable. There are four nationwide facilities-based providers

⁵ Communications Daily, *Regulatory Uncertainty Created by FCC Seen Limiting Network Investment*, July 15, 2010 (quoting Citigroup Managing Director Mike Rollins as saying “Investors like certainty and visibility of policy,” and “[t]he reason it’s so important in telecom is those investments are very long term in nature. You put a dollar of capital in the ground for broadband today and the payback could be at least three to five years, in more cases than not, it’s five to ten”); Yu-Ting Wang & Howard Buskirk, *Reclassification Said to Pose Broad Risk to U.S. Economy*, Communications Daily, at 1 (June 14, 2010) (Jonathan Chaplin of Credit Suisse explaining that “[t]he biggest disconnect between Washington and Wall Street is on how the competitiveness of the industry is viewed. . . . Competition is doing its job and regulations would make it very difficult for companies to get reasonable return on investment. . . . The threat of regulation could discourage investment and cost jobs[.]”); Anna-Maria Kovacs, *Telecom Regulatory Note: D.C. Circuit vacates FCC’s Comcast network-management order*, Regulatory Source Associates, LLC, at 2 (Apr. 7, 2010) (“[W]e would expect the industry – telco, wireless, and cable –to assess capital investments from this point in light of the potential for new and more extensive regulations.”). See also DOJ 1/4/10 Ex Parte at 28 (even in monopoly or duopoly wireline situations “[a]lthough enacting some form of regulation to prevent certain providers from exercising monopoly power may be tempting, care must be taken to avoid stifling the infrastructure investments needed to expand broadband access.”).

⁷ *Fourteenth Report* ¶¶ 27-30.

(with a burgeoning fifth and sixth, Clearwire and SkyTerra), a number of substantial and quickly growing regional providers (such as Leap and MetroPCS), and over one hundred smaller facilities-based providers.⁷ There are also at least 60 MVNOs, including the fifth largest provider in the nation, Tracfone.⁸ There is significant new entry and much expansion by established providers into new markets, from Clearwire, Leap, MetroPCS, Cox, and others, with exit limited to Commission-approved mergers that were found to *benefit* consumers by, among other things, bringing new competitive offerings to more rural areas. More Americans today have more wireless choices than ever: 273 million people, or 95.8% of population, are served by at least three facilities-based wireless providers,⁹ and the number served by at least two wireless broadband networks increased from 73% in 2008 to 90% in 2009.¹⁰

The Report's summaries and press releases downplay this good news in favor of makeshift HHI calculations. As the text of the Report notes, however, it is universally recognized that such concentration calculations do not measure the effectiveness of competition, but are, at most, an initial screen to identify mergers that may merit additional analysis.¹¹ And here, additional analysis confirms that both the absolute level of the calculated "weighted average" HHI and the recent trend are fully consistent with the effective competition that is evident from observed market performance. Higher concentration is both expected and

⁷ *Fourteenth Report* ¶¶ 27-30.

⁸ *Id.* ¶ 33.

⁹ *Id.* ¶¶ 44-45.

¹⁰ *Id.* ¶ 47.

¹¹ *Id.* ¶ 55 ("market concentration, by itself, is an imperfect indicator of market power"); *see also id.* ¶ 48 (HHI is used principally as an initial "screen" in merger cases and is useful only "together with firm conduct and actual industry performance"). Moreover, as the Report notes, the Justice Department employs a significantly higher initial HHI screen of 2800 in wireless merger cases. *Id.* ¶ 49 & n.109.

beneficial in capital-intensive industries like wireless. Indeed, the American wireless marketplace is the least concentrated among all OECD countries, and U.S. consumers directly benefit from the scale economies reflected in the large customer bases of the leading providers. And the modest HHI increase observed from 2007 to 2008 (after modest decreases in prior years) is, upon examination, the product of *intensified*, not reduced, competition: (1) customers taking advantage of competitive rivalry to switch to the carriers that offer them the best value propositions, and (2) mergers that the Commission expressly found to benefit the public. In all events, the Commission’s approach of jumbling together local HHIs that vary widely between urban and rural areas to obtain a national “average” and ignoring MVNOs altogether provides a highly misleading and overstated view of actual market concentration.

The second factor – observed market performance – like market structure, demands a finding that competition is effective. Subscriberhip increased by six percent to an all-time high, 277 million, which represents a 90 percent penetration rate.¹² Smaller providers like Leap and MetroPCS increased their subscriber bases by 24 and 29 percent, respectively in 2009 – in both cases, gaining more new customers than either Sprint or T-Mobile – and continue rapidly to expand their coverage and customer bases.¹³ Average minutes of use remain high, text messaging traffic has grown exponentially (to 740 billion messages in the first half of 2009), and

¹² *Id.* ¶ 155.

¹³ *Id.* ¶ 175 & Chart 20. *See also* MetroPCS Reports First Quarter 2010 Results, *Record First Quarter Adjusted EBITDA and Net Subscriber Additions* (May 6, 2010) (“With this strong customer response to our Wireless for All plans, our consolidated subscriber base grew dramatically: over 10% during the first quarter. Also, over the past 12 months, in the midst of a weak economy and an increasingly competitive landscape, we have grown our subscriber base by over 21%. . . . We believe our new initiatives including our deployment of 4G LTE, and our focus on providing a post-pay experience on a no-signed contract, unlimited, flat-rate basis, improves our competitive position now and in the future.”); Leap Press Release, *Leap Reports 446,000 Net Customer Additions for Cricket Services in First Quarter 2010* (May 6, 2010).

wireless data traffic is through the roof (an estimated 85 terabytes in 2009).¹⁴ And consumers receive much more for every dollar they spend than in previous years.¹⁵

Here, again, though, the *Fourteenth Report* strains to find the dark lining in the silver cloud, focusing on misleadingly gloomy discussions of capital expenditures and the new category of accounting “profitability.” Far from representing a sign of diminished competition, the extraordinary level of industry capital expenditures is all the more remarkable given that it occurred in the most severe recession since the great depression. And, beyond that, the Commission’s calculations exclude entire categories of investment, including expenditures for spectrum, investments made for services that had not been turned up (thus excluding investment for geographic expansion into new service areas and investments for new technologies like LTE), and the substantial investments by those other than the largest providers. Moreover, the *Fourteenth Report’s* own tables show that even under this incomplete view, all of the major wireless providers *increased* their capital expenditures except for Sprint, which experienced a precipitous decline in investment as it shifts to a reliance on Clearwire – a single firm decline that completely explains the slight decline overall. Of course, given the inherent “lumpiness” of long-term network investments – investment may be higher one year as networks are upgraded to a new technology and lower the next year – it would be nonsensical to draw negative conclusions even if *every* firm experienced a single year decline in the level of its capital investment. And the Report itself acknowledges why EBITDA comparisons (a measure for which no GAAP standard exists) could not aid the effective competition inquiry even if a match between accounting, and true economic profits, could be assumed: in an industry defined by capital intensity, EBITDA comparisons ignore variations in firms’ investment activity that preclude

¹⁴ *Fourteenth Report* ¶¶ 176-83.

¹⁵ *Id.* ¶¶ 202-06.

apples-to-apples comparison.¹⁶

Provider conduct also confirms robust competition. The *Fourteenth Report* describes the many ways in which wireless providers compete vigorously to offer innovative pricing plans¹⁷ and the rapid growth of prepaid service plans.¹⁸ The Report also details the wireless industry's enormous investments to extend coverage and to upgrade the technology of their networks.¹⁹ If anything, this competitive activity has accelerated since the report was released, with providers continuing to expand and upgrade their networks, improve their pricing plans, and offer an ever increasing array of cutting edge devices and applications. Wireless providers have also intensified their efforts to differentiate themselves through partnerships with device manufacturers and operating system designers, and those trends are continuing today with the recent introduction of phones like the iPhone 4, Droid X, and HTC EVO, as well as data-only devices like the iPad – with the result that wireless consumers are able to do far more with their wireless services than ever before. The only “negative” the Report can find is a slight decrease in total advertising spending in 2008, but here too, the real story is unambiguously positive. Although absolute amounts declined slightly in 2008, the wireless industry actually *increased* its advertising relative to other industries (as the Report notes, at ¶ 129), and because the cost of advertising decreased substantially during this recessionary time period, the wireless industry actually engaged in *more* advertising, not less.

¹⁶ *Id.* ¶¶ 215-18.

¹⁷ *Id.* ¶ 88 (“the pricing conduct of mobile wireless providers in 2009 and early 2010 included changes in the monthly price of service plans, the attachment of additional features to existing plans, the introduction of new pricing options for customers who choose to forego discounted handsets, and the launch of new unlimited prepaid service offerings”); *see also id.* ¶¶ 89-92, Table 10.

¹⁸ *Id.* ¶¶ 98-103.

¹⁹ *Id.* ¶¶ 105-23.

Finally, consumers clearly know how to vote with their feet to find the best values and bargains. Wireless consumers have many sources of information about wireless services. Rates of satisfaction are high,²⁰ and although the Report does not highlight it, consumer complaints are at an all-time low. Churn rates confirm again that consumers frequently switch providers; indeed, approximately one quarter of customers switch their service providers each year and whatever “switching costs” may exist plainly are not an impediment to competition.²¹

In short, the Commission should abandon the search for a dark lining in the silver wireless cloud and return to its historic practice of answering the question Congress asked based upon the real marketplace facts: the wireless marketplace plainly is effectively competitive.

I. MARKET STRUCTURE CONSIDERATIONS CONFIRM THAT THE WIRELESS MARKETPLACE IS INTENSELY COMPETITIVE.

Historically the Commission has begun its analysis with an assessment of “market structure.” In the *Fourteenth Report*, the Commission presented extensive evidence that the wireless marketplace is fully open to effective competition. More Americans have more competitive choices than ever, as almost all Americans can choose from at least three facilities-based providers, and the vast majority can choose from at least five. The Commission has also taken action to remove regulatory barriers to entry, particularly with regard to tower siting approvals, which has made the marketplace even more conducive to competition.

The Commission’s summary and press releases, however, scrupulously de-emphasize these facts in favor of the Commission’s calculations of HHI. They do so, moreover, even though it is well-settled among economists and antitrust regulators that measures of market

²⁰ *Id.* ¶¶ 231-32; *see also, e.g.*, John Horrigan, Ellen Satterwhite, FCC Survey, *Americans’ perspectives on online connection speeds for home and mobile devices*, at 1, available at http://www.fcc.gov/Daily_Releases/Daily_Business/2010/db0601/DOC-298516A1.pdf (finding that 92 percent of customers were satisfied with their mobile wireless service).

²¹ *Id.* ¶¶ 244-48.

concentration (even assuming they are accurate) are not conclusory as to whether a market is competitive.²² Rather, the HHI is intended to be an initial screen used in merger proceedings, a starting point for analysis used to determine which markets are worthy of further investigation. By exalting the HHI to a status it does not warrant and de-emphasizing the marketplace facts that demonstrate vigorous competition, the *Fourteenth Report* – and, in particular, the Executive Summary and press releases attending its release – paint a distorted view of competition in the wireless marketplace.

Ironically, a proper, if myopic, focus on HHI does not, in all events, suggest a market structure that is not conducive to competition. This years slight increase in HHI is due entirely to pro-competitive factors (mergers that were found to be in the public interest and gains by carriers that did what they are supposed to do in a competitive marketplace – compete to win customers from their rivals), and the HHI is still well within a range that is consistent with effective competition (indeed, the American wireless marketplace is the least concentrated among the leading industrialized nations in the world). Moreover, the way the Commission calculates weighted average HHIs is highly misleading, because it uses a “weighted average” of the HHIs in each EA, which hides the fact that most people live in areas with significantly lower HHIs and ignores the significant competitive force of MVNOs altogether.

The *Fourteenth Report* also raises questions about the fact that AT&T and Verizon own significant amounts of spectrum below 1 GHz, and whether the fact that such spectrum can have superior propagation characteristics than spectrum above 1 GHz raises competitive concerns. As shown below, this is a red herring. First, it was the introduction of high-band PCS spectrum that

²² It is well known, for example, that markets displaying very little concentration (*e.g.*, real estate agents) may fail to perform competitively, while markets displaying extremely high concentration (*e.g.*, large jetliners) may be extremely rivalrous.

revolutionized the industry, not sub-1 GHz spectrum. Second, the *Fourteenth Report* fails to account for the advantages of high-band spectrum, including the fact that it can provide greater capacity, is available in larger blocks, and that there is more of it. Third, experience proves that pro-competitive spectrum policies that auction flexible use licenses to those that value them most have promoted, not hindered, entry and expansion, and that attempts by other countries to micromanage spectrum allocations have either been abandoned or proved to be monumental failures.

A. The Facts In The *Fourteenth Report* Confirm That Wireless Market Structure Promotes Robust Competition.

The *Fourteenth Report* collects an abundance of competitive *facts* that all point in the same direction: the wireless marketplace is wide open to competition. There continue to be four strong national wireless providers and dozens of regional and local providers, and these smaller providers are the fastest growing.²³ The vast majority of these wireless providers offer national coverage, using a combination of their own facilities and roaming arrangements.²⁴ As described below, the *Fourteenth Report* documented expansive new entry by well-financed competitors, as well as the continued expansion of more than 60 Mobile Virtual Network Operators (up from 40 in the *Thirteenth Report*) that lease airtime from facilities-based providers and use it to compete intensely against facilities-based providers. Indeed, the fifth largest provider in the U.S. is an MVNO.²⁵ In addition, the *Fourteenth Report* confirms that (again) the U.S. wireless industry is the least concentrated of the 26 major industrialized countries followed by the OECD, and that

²³ *Fourteenth Report* ¶ 27; *Fourteenth Report* ¶ 175 (“MetroPCS and Leap, while smaller than the top four providers, increased their subscriber bases by about 24 and 29 percent, respectively in 2009,” each of which is a substantially greater increase than any other provider); *see also id.* ¶ 72.

²⁴ *Fourteenth Report* ¶ 29.

²⁵ *Id.* ¶ 33.

remains true today.²⁶

Given the dozens of carriers competing in the marketplace, it should come as no surprise that the vast majority of Americans, even in remote rural areas, have lots of competitive choices. The *Fourteenth Report* shows that 96.1% of U.S. customers can choose among at least three wireless voice competitors, 91.3% can choose among at least four wireless voice competitors, and that 74.4% of U.S. consumers can choose among at least 5 voice competitors.²⁷ All of these numbers are up significantly from the *Thirteenth Report* and represent all-time highs.²⁸ Moreover, the level of choice is not appreciably different in rural areas: the Commission specifically found that in areas “with a population density of 100 persons or fewer per square mile,” “the percentage of the rural population with coverage by one or more providers (98.5 percent), or two or more providers (94.5 percent) is comparable to coverage for entire U.S. population” (¶ 353) and that 83.1% of these rural customers have access to 3 or more competitors. Again, these metrics are all *up* compared to the *Thirteenth Report*.²⁹

The same is true for wireless broadband services. For the first time, the Commission provided statistics on the percentage of consumers with access to competing broadband providers, and these numbers too are very impressive. The *Fourteenth Report* shows (Table 7) that almost all – 98.1 percent – U.S. consumers have access to wireless broadband services, almost 90 percent can choose among at least 2 competitors, almost 75 percent can choose among at least three competitors, and nearly 60 percent can choose among four or more. The report

²⁶ *Fourteenth Report* ¶ 365, Table 41; CTIA Slide Presentation, *Mobile Wireless Competition in the U.S.*, at 5 (May 11, 2010) (attached to *Ex Parte* Letter from Christopher Guttman-McCabe (CTIA) to Marlene H. Dortch (FCC), GN Docket No. 09-157 (dated May 10, 2010)) (“CTIA May 2010 Wireless Market Statistics”).

²⁷ *Fourteenth Report* ¶ 42, Table 5.

²⁸ *Compare Fourteenth Report* ¶ 42, Table 5 with *Thirteenth Report* ¶ 42, Table 2.

²⁹ *Fourteenth Report* ¶ 354.

confirms (Table 39) that the numbers for rural areas with 100 or fewer consumers per square mile are also improving quickly: more than 92 percent of such consumers have access to mobile broadband services, and 61.8 percent can choose among at least two alternative providers. And, of course, consumers in rural areas have access to fixed broadband services as well.

The openness of the marketplace is not mere conjecture – it is confirmed by the indisputable *fact* of substantial new entry. The *Fourteenth Report* describes in detail (¶¶ 69-73) new entry and expansion into new areas by Clearwire (using Wi-Max technology), Cox Communications (CMRS, EV-DO, LTE), and Leap and MetroPCS (CMRS, EV-DO, and LTE). The comments submitted by CTIA in this proceeding provide additional data showing that providers are continuing to enter, expand, and upgrade their networks in 2010, resulting in more and better choices for consumers. For example, at the end of 2009, Clearwire provided its Wi-Max service in 27 markets covering about 34.5 million people.³⁰ In early 2010, Clearwire expanded to 44 markets, covering about 51 million people,³¹ and expects to enter 19 more markets this summer and 10 additional markets by the end of 2010.³² Clearwire has already added more subscribers in the first quarter of 2010 than it did over the entire year in 2009.³³

In addition, Harbinger recently committed, as a condition of its acquisition of Skyterra, to deploy a nationwide mobile wireless network that will cover 90 percent of the U.S. customers with a terrestrial 4G network and 100 percent of U.S. customers using a satellite network.³⁴

³⁰ *Fourteenth Report* ¶ 70.

³¹ Clearwire website, <http://investors.clearwire.com/phoenix.zhtml?c=214419&p=irol-corpoverview>.

³² Clearwire New Release, Clearwire Reports Strong First Quarter 2010 Results (May 5, 2010), available at <http://investors.clearwire.com/phoenix.zhtml?c=198722&p=irol-newsArticle&id=1422880>.

³³ *Id.*

³⁴ Memorandum Opinion And Order And Declaratory Ruling, *SkyTerra Communications, Inc.*,

Harbinger has already raised \$1 billion in financing for this project, and it recently “entered into a \$7 billion, eight-year agreement with Nokia Siemens Networks to build, install and operate Harbinger’s terrestrial satellite mobile broadband network.”³⁵ This agreement “lay[s] to rest some of the questions that have surrounded Harbinger’s ambitious system deployment plan since the company guaranteed its layout schedule to the [Commission].”³⁶

By contrast, the *Fourteenth Report* identifies *no* competitively harmful exit in the mobile wireless marketplace. Rather, as discussed further *infra*, all of the “exits” identified in the *Fourteenth Report* are the result of mergers and acquisitions that were scrutinized by the Commission and the Justice Department and conditioned on divestitures and other remedies to ensure that they did not result in undue concentration.³⁷

Transferor and Harbinger Capital Partners Funds, Transferee; Applications for Consent to Transfer of Control of SkyTerra Subsidiary, 25 FCC Rcd. 3059, ¶ 56 (2010) (“*Harbinger/Skyterra Merger Order*”) (“Harbinger’s network will cover 100 percent of the U.S. population via the satellite component and ultimately over 90 percent of the population via its terrestrial component. Service will begin in two trial markets with a commercial launch commencing before the third quarter of 2011, providing service for up to 9 million POPs. Excluding satellite coverage, Harbinger has committed to a build-out schedule of its 4G terrestrial network that will provide coverage in the United States to at least 100 million people by December 31, 2012, at least 145 million people by December 31, 2013, and at least 260 million people by December 31, 2015.”).

³⁵ Peter B. de Selding, *Harbinger Strikes Deal with Nokia Siemens for SkyTerra Ground Network*, Space News (July 20, 2010), available at http://www.spacenews.com/satellite_telecom/100720-harbinger-deal-nokia.html; see also *id.* (“Harbinger earlier had agreed to invest \$2.9 billion into the project, now called LightSquared. The company also has agreed to inject an additional \$750 million in equity. To this sum will be added \$1 billion in debt or equity whose source Harbinger and LightSquared declined to name.”).

³⁶ *Id.* (“In exchange for the FCC’s approval of Harbinger’s acquisition of SkyTerra of Reston, Va., which is building two large L-band mobile services satellites, Harbinger promised that the multibillion-dollar ground network, consisting of some 40,000 cellular towers to work in concert with the satellites, would reach 260 million Americans by 2015.”).

³⁷ *Fourteenth Report* ¶ 75 (“In markets where the entities were significant competitors, the Commission may have required divestitures in specified markets as conditions of the transaction in order to prevent competitive harm.”).

The *Fourteenth Report* also documents various Commission actions to remove regulatory barriers to entry and expansion. First, the Commission adopted new rules to reduce delays in tower siting caused by state and local requirements, which “sets time frames for state and local zoning authorities to act on a zoning application” and “reduce[s] regulatory barriers to entry by finding that it is a violation of the Communications Act for a state or local government to deny a wireless service facility-siting application because service is available from another provider.”³⁸ Second, the Commission developed a plan to make significant amounts of additional spectrum available to wireless providers.³⁹ Since the *Fourteenth Report*, the Commission has also initiated a rulemaking to remove restrictions on the use of Mobile Satellite Services spectrum for terrestrial wireless services.⁴⁰

Finally, the *Fourteenth Report* confirms again that the Commission’s flexible and market-oriented spectrum policies have fostered entry and have allowed wireless providers to respond quickly and efficiently to rapidly evolving consumer demand. As the report explains, new entrants have many ways to access spectrum, “including purchasing spectrum at Commission auctions, purchasing spectrum in the secondary market, and leasing spectrum in the secondary market,” and that entire firms, such as Spectrum Bridge, are devoted entirely to facilitating secondary market transactions with “online market places for spectrum exchange.”⁴¹ As a result, “spectrum acquisitions [using these various means] have enabled certain operators – including Leap, MetroPCS, and T-Mobile – to expand networks into new markets, and to

³⁸ *Id.* ¶ 59.

³⁹ *Id.*

⁴⁰ Notice of Proposed Rulemaking & Notice of Inquiry, *Fixed Mobile Servs. in the Mobile Satellite Service Bands at 1525-1559 MHz & 1626.5-1660.5 MHz, 1610-1626.5 MHz & 2483.5-2500 MHz, & 2000-2020 MHz & 2180-2200 MHz*, ET Docket No. 10-142 (rel. July 15, 2010).

⁴¹ *Fourteenth Report* ¶ 62.

improve and enhance networks in existing markets.”⁴² And the Commission’s efforts to free up more spectrum for mobile wireless use promise to facilitate further competitive entry and expansion.

B. The Report’s Focus On A Supposed Increase In “Concentration” Is Both Misguided and Misleading.

Although the Report itself confirms that the wireless marketplace is conducive to robust competition, the “headline” in the Commission’s summaries and press releases accompanying the Report is that market concentration has supposedly increased,⁴³ and the Commission buries in the back of its report the fact that the United States has the lowest concentration among OECD countries.⁴⁴ Indeed, the Commission goes out of its way to emphasize that by “one widely-used measure of industry concentration” – the Herfindahl-Hirschman Index (“HHI”) – concentration increased by 32 percent in the last five years and by 6 percent in the past year.⁴⁵ There is no defensible basis for concern, however, because (1) HHIs are merely a screen for merger analysis that say nothing about the effectiveness of competition, and the facts here show that the slight increases were due to pro-competitive developments, and (2) the Commission’s method of calculating HHIs is inaccurate and misleading in all events.

The Facts Here Dispel Any Concern About the HHI. The HHI is an analytical tool developed for use in merger proceedings. It is a starting point for determining whether a merger “is likely to create or enhance market power or to facilitate its exercise.”⁴⁶ As economists have

⁴² *Id.* ¶ 107.

⁴³ *Id.* ¶ 4.

⁴⁴ *Id.* ¶ 365, Table 41.

⁴⁵ *Id.* ¶ 4.

⁴⁶ U.S. Department of Justice and Federal Trade Commission, *Horizontal Merger Guidelines*, § 0.2.

explained, however, the “Merger Guidelines approach . . . was not designed to measure the existence of market power.”⁴⁷ Indeed, the Guidelines take current price levels and the existing level of competition as a given; they do not provide any means for determining whether the market is in fact competitive or whether current price levels are competitive.⁴⁸ Concentration metrics are meaningless by themselves,⁴⁹ and it has thus been “many years since anyone knowledgeable about” competitive analysis “thought that concentration by itself imported a diminution in competition.”⁵⁰

Even in the context of a merger review, the HHI is merely an initial screen, to determine whether it would be useful to take a closer look at the actual marketplace facts.⁵¹ As explained by the Commission, “[i]n evaluating the competitive effects of this transaction, our initial [HHI] screen eliminates from further review those markets in which there is clearly no competitive harm relative to today’s generally competitive [wireless] marketplace.”⁵² Concentration

⁴⁷ Reply Declaration of Dennis W. Carlton, Allan L. Shampine, & Hal S. Sider, ¶ 53 (Exhibit A to Reply Comments of AT&T Inc., *Special Access Rates for Price Cap Local Exchange Carriers*, WC Docket No. 05-25 (filed Feb. 24, 2010)) (“Carlton-Shampine-Sider Reply Decl.”) (emphasis in original).

⁴⁸ *Id.* ¶ 54.

⁴⁹ See, e.g., Declaration of Michael Katz, ¶¶ 16, 23 (“Katz Decl.”) (“measures of concentration suffer from several drawbacks that limit their usefulness or invalidate them as stand-alone indicators,” and “it would be a mistake to simply assume that the market in question is not effectively competitive” merely based on such indicators) attached to Reply Comments of AT&T Inc., *Wireless Telecommunications Bureau Seeks Comment On Commercial Mobile Radio Servs. Market Competition*, WT Docket No. 09-66 (filed July 12, 2009); see also *Fourteenth Report* ¶ 48 (pointing out that HHI measures are useful only when “evaluated together with firm conduct and actual industry performance”).

⁵⁰ *Capital Cities/ABC, Inc. v. FCC*, 29 F.3d 309, 315 (7th Cir. 1994); *U.S. v. Syufy Enters.*, 903 F.2d 659, 665-66 (9th Cir. 1990) (“In evaluating monopoly power, it is not market share that counts but rather, the ability to *maintain* market share”) (emphasis in original).

⁵¹ See *id.*, ¶¶ 16-30.

⁵² Mem. Op. & Order, *Applications of AT&T Inc. & Centennial Communications Corp. For Consent to Transfer Control of Licenses, Authorizations, & Spectrum Leasing Arrangements*, 24

measures “are the beginning, not the end, of the competitive analysis” because they merely provide “information as to which markets need more in-depth, multidimensional analysis of potential anticompetitive effects.”⁵³ And the DOJ and FTC are affirmatively moving *away* from rigid use of the HHI in analyzing the potential impact of mergers; the revised draft of the Guidelines now emphasizes that concentration measures do not “provide a rigid screen to separate acceptable mergers from anticompetitive transactions” but instead only “provide one way to identify those mergers for which it is particularly important to examine whether other competitive factors confirm, reinforce, or would counteract the potential harmful effects of increased concentration.”⁵⁴

Because the HHI is only the starting point of a market structure analysis in the context of a merger review proceeding, the *Fourteenth Report*’s emphasis of HHI data, particularly in the face of so much evidence of vigorous actual competition, was improper. Even if these findings with regard to the HHI were accurate and complete, these findings would not trump the compelling data demonstrating that actual wireless competition is as robust as ever, if not more so. But, in fact, the analysis of concentration in the *Fourteenth Report* is woefully incomplete. The Commission makes much of the fact that its estimate of the average HHI increased by 6 percent (even though the HHI has been essentially stable for several years),⁵⁵ but an examination of the actual marketplace facts confirms that the small increase in HHI was due to two factors,

FCC Rcd. 13915, ¶ 46 (2009) (“*AT&T-Centennial Order*”).

⁵³ Memorandum Opinion & Order, *Applications of AT&T Wireless Services, Inc. and Cingular Wireless Corporation; For Consent to Transfer Control of Licenses and Authorizations*, 19 FCC Rcd. 21522, ¶ 96 (2004) (“*AT&T-Cingular Merger Order*”).

⁵⁴ Draft Horizontal Merger Guidelines, at 19.

⁵⁵ The statement that HHI’s have increased by 32% since 2003 (*Fourteenth Report* ¶ 4) is misleading, because the vast majority of that increase occurred from 2003 to 2005. The HHI has been stable and fluctuating in a narrow range since, and actually had been declining prior to 2008.

both of which are pro-competitive: Commission-approved mergers and competitive wins in the marketplace.

As the *Fourteenth Report* notes, one of the main factors contributing to the 6% increase in HHI levels was a series of mergers that occurred in 2008.⁵⁶ The Commission approved these mergers only after considering the mergers' impact on competition and adopting appropriate conditions that "prevent[ed] *entirely* consolidation in individual markets from advancing to a point at which it would threaten competition and potentially harm consumers."⁵⁷ The Commission thus concluded that each of these mergers "would serve the public interest, convenience, and necessity."⁵⁸ For example, in the Verizon-Alltel merger, the DOJ and the Commission required, as a condition of their approval, that Verizon and Alltel divest spectrum and other assets in every area where the merger would have reduced the number of wireless competitors to three or fewer.⁵⁹ These mergers have manifestly benefited consumers and intensified competition – often resulting in a national or large regional provider entering a rural or underserved area, bringing customers in those areas access to the same wireless services and products that are available to customers in the most densely populated areas.⁶⁰

⁵⁶ *Fourteenth Report* ¶ 51. These mergers include "AT&T/Aloha (August 2008), T-Mobile/Suncom (February 2008), Verizon Wireless/Rural Cellular (August 2008), and Verizon Wireless/Alltel (January 2008)." *Id.*

⁵⁷ Mem. Op. & Order & Declaratory Ruling, *Applications of Cellco Partnership d/b/a Verizon Wireless and Atlantis Holdings LLC; For Consent to Transfer Control of Licenses, Authorizations, and Spectrum Manager and De Facto Transfer Leasing Arrangements and Petition for Declaratory Ruling that the Transaction is Consistent with Section 310(b)(4) of the Communications Act*, 23 FCC Rcd. 17444, ¶ 4 (2008) ("*Verizon-Alltel Merger Order*") (emphasis added).

⁵⁸ *Id.* ¶ 3.

⁵⁹ *Id.* ¶ 101.

⁶⁰ See, e.g., *Id.* ¶ 119-156 (these transactions "result in expanded and improved services and features for wireless customers, especially in rural areas," "increased broadband deployment and next generation services," "higher quality service," and "increase[d] efficiency and . . .

The other main reason why the HHIs increased slightly from 2007 to 2008 is that the certain providers gained market share in some EAs by successfully winning customers from other providers in the normal back and forth as providers compete for customers – a hallmark of competition, not a lack of it. For example, Sprint, due to a number of factors, lost millions of customers to rivals that offered them better services, a trend that Sprint has only recently begun to curb the old-fashioned way: by advertising lower prices, better service and more amenities.⁶¹ Individual provider fortunes ebb and flow, but the increased concentration that results from these market share increases and decreases must be recognized for what it is: confirmation of an effectively competitive marketplace.

In all events, even relatively “high” measures of “concentration” are fully compatible with a vigorous competitive wireless industry. The current FTC and DOJ economists have strongly criticized any attempt to “link[] increases in concentration to declines in market performance,” explaining that “[i]n recent decades . . . industrial organization scholars and the courts have been more apt to stress that high concentration can be compatible with vigorous competition and efficient market performance.”⁶² Study after study shows that “a number of U.S. industries – including several that nearly all would regard as competitive – are relatively concentrated” as measured by HHIs.⁶³ And, as Professor Dennis Carlton has explained, the DOJ

economies of scale and scope.”).

⁶¹ See Sprint News Release, *Sprint Nextel Reports Second Quarter 2010 Results* (July 28, 2010), available at <http://investors.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle&ID=1452819&highlight=> (“The company achieved its best year-over-year quarterly improvement in postpaid gross subscriber additions in more than five years”).

⁶² Joseph Farrell & Carl Shapiro, *Antitrust Evaluation of Horizontal Mergers: An Economic Alternative to Market Definition*, at 4 (Working Paper, Nov. 25, 2008).

⁶³ George Ford, Thomas M. Koutsky, Lawrence J. Spiwak, *Competition after unbundling: entry industry structure, and convergence*, Federal Communications Law Journal, at 339 (March 2007) (For example, the household refrigerator and freezer business has an HHI of over 2000,

and FTC have chosen not to challenge large portions of merger proceedings with concentration ratios of 3000 and higher.⁶⁴

High HHIs are particularly commonplace in markets that, like wireless, are characterized by high sunk costs and large economies of scale and scope.⁶⁵ “As consistently demonstrated by academic research, given the huge fixed and sunk costs inherent to the construction and commercial operation of communications networks, the equilibrium level of concentration of terrestrial firms in the local communications markets (voice, video, and data) will be relatively high.”⁶⁶ When the Commission has previously reported CMRS HHIs, it has cautioned that, where “the scale [or] output at which a firm can fully exploit scale economies (the minimum efficient scale) is large relative to potential demand, there will be room in the market for only a small number of firms operating at the lowest possible cost” and, as a result, “market concentration in such industries will tend to be high relative to industries characterized by greater potential demand or smaller minimum efficient scale.”⁶⁷ Similarly, when reviewing wireless mergers, the Commission employs a “screen” under which it has determined that where the merger will result in an HHI below 2800 and will not increase the HHI by more than 250, “there is clearly no competitive harm in today’s generally competitive marketplace.”⁶⁸

silverware manufacturing has an HHI of nearly 2800, and glass container manufacturing has an HHI of 3000).

⁶⁴ Dennis W. Carlton, Comment on Department of Justice And Federal Trade Commission’s Proposed Horizontal Merger Guidelines, ¶ 12 (filed June 4, 2010).

⁶⁵ See Katz Decl. ¶¶ 21-23, 30.

⁶⁶ George Ford, Thomas M. Koutsky, Lawrence J. Spiwak, *Competition after unbundling: entry industry structure, and convergence*, Federal Communications Law Journal, at 4 (March 2007).

⁶⁷ *Ninth Report* ¶ 55; see also *Tenth Report* ¶ 47; *Eleventh Report* ¶ 46; *Twelfth Report* ¶ 53; *Thirteenth Report* ¶ 48.

⁶⁸ Memorandum Opinion & Order, *Applications of Wireless Telecommunications, Inc., Debtor-In-Possession, Assignor and The Vermont Telephone Company, Inc., Assignee*, 24 FCC Rcd.

Here, according to the data in Appendix C to the *Fourteenth Report*, more than 70 percent of the U.S. population is located in EAs with an HHI below 2800. The remaining 30 percent are typically located in much more rural areas that can support fewer firms than less rural areas. The HHIs in many of these areas, however, would fall below 2800 if the calculation included MVNOs. Even without MVNOs, virtually all of these areas still have three or more facilities-based competitors (*see Fourteenth Report*, Table 5), and at least one of these competitors is typically a national competitor. AT&T and other national competitors offer the same services, devices options, voice plans, data plans, and other benefits throughout their service areas, and thus consumers in these areas benefit from the same nationally available pricing and options that are offered to more urban consumers. HHIs are just a starting point for analysis, and the actual *facts* concerning the wireless marketplace confirm that “concentration” poses no legitimate issue for the openness of competition in this marketplace.

The Commission’s HHIs Are Inaccurate and Misleading. Beyond that, the HHI figure used in the *Fourteenth Report* is not actually an HHI. Rather, it is a weighted average, by population, of the HHIs of each Economic Area (“EA”) across the country. A proper HHI statistic is the sum of the squares of the market shares of each provider in the market being examined. The Commission’s approach of arbitrarily dividing providers’ market shares among different EAs and then recombining them through weighted averaging does not produce an HHI metric at all, but rather a largely meaningless, Frankenstein statistic that of mathematical necessity will produce higher HHI metrics than properly calculated national HHI statistics.

The Commission’s “weighted average” hides the reality of the wireless marketplace. The overall HHI of the wireless marketplace, taken as a national market, is far below 2800 (about

3177, ¶¶ 15-16 (2009).

2200 by one estimate cited in the *Fourteenth Report*).⁶⁹ Similarly, the vast majority of Americans live in EAs that have HHIs well below 2800. There is a small percentage of Americans who live in very rural areas that cannot support a large number of facilities-based providers, and HHIs are – predictably – significantly higher in those EAs. The Commission could reasonably look at either of these measures – *i.e.*, recognizing that national and regional wireless providers typically do not charge different prices or offer different service plans in different areas, it could accept that the national marketplace is remarkably unconcentrated, or it could do an EA specific analysis and acknowledge that very rural areas present special challenges that could perhaps be met with targeted subsidies or other similar measures. But what it cannot reasonably do is hide the reality in a “weighted average” that systematically increases the HHI calculations and thus effectively artificially inflates concentration of the entire national marketplace. Gerrymandering the market participants’ shares into smaller areas in this fashion, simply to create higher “local” market shares, which are then squared and averaged back into a “weighted average,” obfuscates the issues. In essence, the squaring of the rural market shares is dominating the effect of weighting the average by population, and the result is a misleading “average” that masks the fact that the vast majority of the nation lives in EAs with HHIs well below 2800.

The result is a false precision that actually produces no useful information. The Commission compares its weighted average to the thresholds used by the Commission, DOJ and other agencies when assessing ordinary HHI computations, but this is an apples-to-oranges comparison, because those agencies do not use those types of weighted averages in merger proceedings. The weighted average tells the Commission little about what is happening

⁶⁹ *Fourteenth Report*, Chart 41.

anywhere, either locally or nationally. For example, according to the Commission's data, the Chicago EA has one of the lowest HHI values for 2008 at 2140, which is actually *down* slightly from 2151 in 2007. The Burlington, Vermont EA has one of the highest 2008 HHIs at 8263, which is 73% higher than the 2007 HHI of 4776. When these values are averaged (weighted by EA population), the average 2007 HHI was 2309 and the average 2008 HHI was 2551, an increase of about 242 or 10.5%. But this statistic tells the Commission nothing about what happened in either Chicago (where HHIs went down) or Burlington (where HHIs are much higher), and combining figures like these provides no insight at all into the overall national market structure.

The Commission's methodology has other problems as well. Most notably, it does not count MVNOs. MVNOs are providers that purchase minutes from facilities-based providers and independently resell those minutes, along with substantial customer support, in competition with the facilities-based provider. MVNOs are among the largest and fastest growing competitors in the United States. Indeed, one MVNO, Tracfone, is the *fifth* largest wireless provider, in terms of subscribers, in the nation.⁷⁰

The Commission's analysis lumps MVNO customers into the total number of customers for the facilities-based provider from which the MVNO purchases its minutes (the "host provider"). But this fails to account for the significant competitive pressure that MVNOs actually place on facilities-based providers. MVNOs compete vigorously with innovative pricing plans, service offerings, customer support, devices, applications, and much else, and they routinely win customers from facilities-based providers, including their host providers. Host providers have strong incentives to compete vigorously against all MVNOs – including those for

⁷⁰ *Fourteenth Report* ¶ 33.

which it is the host provider – to win the retail customer. As the *Fourteenth Report* notes, “[a]nalysts see both the Straight Talk unlimited offering and the Boost Unlimited plan [both prepaid offerings by MVNOs] as competitive threats to [prepaid] unlimited players Leap and MetroPCS [both facilities-based providers].”⁷¹ The Commission’s failure to account for this very substantial source of competition in its average HHI statistics makes its conclusions even more unreliable.

C. The Commission’s Focused On The Allocation Of Spectrum Is A Red Herring.

The Commission’s historic policies of allocating spectrum under flexible licenses to the highest value user are in no small part responsible for the unprecedented levels of investment, innovation, and expansion in the wireless marketplace documented in the *Fourteenth Report* and throughout these comments. The *Fourteenth Report*, however, tries to turn this lemonade into lemons. The *Fourteenth Report* explains that spectrum below 1 GHz can have better propagation characteristics than spectrum above 1 GHz, and that competition therefore may be affected by the fact that providers with more sub-1 GHz spectrum may be able to deploy service using fewer cell towers than providers with spectrum above 1 GHz. This concern is clearly unwarranted, for several reasons.

⁷¹ *Id.* ¶ 102. For example, “[f]ollowing the launch of Tracfone’s low priced service offering, MetroPCS enhanced its unlimited local calling plan in August 2009 by reducing the monthly charges for add-on features such as text messaging and various other data services. Leap responded with similar changes to the pricing of add-on features for its Cricket service plans shortly thereafter. MetroPCS made another round of similar price cuts to add-on features in the fourth quarter of 2009, and Leap again followed suit. With each round of changes, MetroPCS and Leap lowered the monthly recurring charge for applicable features by five to ten dollars.” *Id.* ¶ 103. In addition, Sprint recently purchased Virgin Mobile USA – an MVNO – and explained that “Sprint is committed to growing its prepaid business and this transaction will provide us with the resources and opportunities to compete more aggressively, and strengthen our position in prepaid.” Sprint Press Release, *Sprint Nextel To Acquire Virgin Mobile USA* (July 28, 2009), available at http://newsreleases.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle_newsroom&ID=1312854.

First, history teaches that access to sub-1 GHz is hardly vital to competition. The introduction of 120 MHz of PCS spectrum at 1.9 GHz revolutionized the industry, clearly demonstrating that higher-band spectrum can and has played a significant role in fostering competition.

Second, the Commission's discussion completely fails to account for the capacity-centric deployments that network providers are designing today to support 3G and 4G services. Today, capacity and throughput (not propagation) are king. In this critical respect, the *Fourteenth Report* admits that spectrum *above* 1 GHz has distinct advantages, particularly in urban and suburban areas where there are significant sub-1 GHz spectrum constraints. For example, spectrum above 1 GHz can provide greater capacity in the geographic area it covers,⁷² it is available in larger blocks, and there is more of it.⁷³ In short, propagation characteristics are only one of many characteristics of spectrum, and pointing to one of its advantages without considering advantages of other spectrum provides no relevant insight into the competitive landscape.

Third, the notion that a lack of spectrum under 1 GHz is a barrier to entry or expansion is

⁷² See, *Fourteenth Report* ¶ 272 (“Conversely, higher frequency spectrum may be particularly effective for providing significant capacity, or increasing capacity, within a smaller geographic area. In certain situations, higher frequency bands can achieve greater improvements in capacity. For instance, capacity enhancement technologies such as MIMO may perform better at higher frequencies. . . . Thus higher-frequency spectrum can be ideally suited for providing high capacity where it is needed, such as high-traffic urban areas.”).

⁷³ *Id.* (“[I]n many parts of these higher bands, spectrum is licensed in larger contiguous blocks, which can enable operators to deploy wider channels and simplify device design”). The *Fourteenth Report's* assertion that improved propagation characteristics for sub-1 GHz spectrum can reduce the number of cell towers needed to cover an area and thus reduce costs is also flawed, because it fails to account for the many other cell tower costs. Clearwire, for example, claims that its cell tower costs using 2.5 GHz spectrum are nearly half that of other cell providers. See Clearwire Investor Presentation, Feb. 10, 2010, slide 10, available at <http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9Mjc4NDc1OHxDaGlsZEIEPTM3MTE4MXxUeXB IPTI=&t=1>.

refuted by real world facts. Providers with all types of spectrum are continuing to make extremely large investments to develop, deploy, upgrade, and expand their networks. Clearwire, for example, is rapidly deploying a nationwide wireless broadband network using its immense holdings of 2.5 GHz spectrum.⁷⁴ Clearwire has touted that it has a “spectrum advantage”⁷⁵ and Clearwire’s partner, Sprint, recently bragged that it had enough spectrum to deploy both a successful nationwide WiMax network *and* a nationwide LTE network.⁷⁶ Similarly, MSS provider Harbinger/Skyterra, which uses spectrum above 1 GHz, has committed to deploying a nationwide MSS-based mobile wireless network within the next few years.⁷⁷ In addition, a lack of sub 1 GHz spectrum has not hampered T-Mobile’s from upgrading and expanding its network to HSPA+, which it claims “now offers 4G speeds to more people than any other wireless network in the country”⁷⁸ Nor has a lack of sub 1 GHz spectrum impeded the rapid entry and expansion of smaller providers, like MetroPCS and Leap, which are the *Fourteenth Report* recognizes are the fastest growing providers in the U.S.⁷⁹

Finally, the assertions in the *Fourteenth Report* that the U.K. and Germany placed limits on the amount of sub-1 GHz spectrum that incumbent in those countries could purchase are

⁷⁴ Clearwire’s 2.5 GHz spectrum holdings significantly exceed the spectrum holdings of either AT&T or Verizon. *See, e.g., Fourteenth Report* ¶ 268, Chart 40.

⁷⁵ *See* Clearwire Investor Presentation, Feb. 10, 2010, slide 12, *available at* <http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9Mjc4NDc1OHxDaGlsZEIEPTM3MTE4MXxUeXB IPTI=&t=1>.

⁷⁶ *See* Communications Daily, July 16, 2010 (Sprint CEO Dan Hesse tells Financial Times “[w]e have the spectrum resources where we could add LTE if we choose to do that, on top of the WiMAX network . . . that is the beauty of having a lot of spectrum is that we have a lot of flexibility”).

⁷⁷ *Harbinger/Skyterra Merger Order* ¶ 56.

⁷⁸ T-Mobile Press Release, T-Mobile HSPA+ Network Now Delivers Broadest Reach Of 4G Speeds In U.S. (July 21, 2010), *available at* <http://press.t-mobile.com/articles/t-mobile-HSPA-4G>.

⁷⁹ *Fourteenth Report* ¶ 175.

irrelevant and only confirm the folly of such “caps.” The U.K. has since *abandoned* those proposed restraints on the grounds that they are not needed to promote broadband competition.⁸⁰

In Germany, the plan did not work. The auction “fizzled out after more than a month of incremental bidding” with only the four incumbents bidding.⁸¹

II. MARKET PERFORMANCE METRICS CONFIRM THAT THE WIRELESS MARKETPLACE IS HIGHLY COMPETITIVE.

As the Commission has explained “[t]he structural and behavioral characteristics of a competitive market are desirable not as an ends in themselves, but rather as a means of bringing tangible benefits to consumers,”⁸² and “consumer outcomes are the ultimate test of effective competition.”⁸³ Accordingly, the Commission has always examined traditional market performance issues, including trends in pricing, penetration, output, investment, innovation, and quality of service. Again, these metrics overwhelmingly show continued improvements over the *Thirteenth Report* when the Commission last found the wireless marketplace to be effectively

⁸⁰ See, e.g., David Meyer, Government sets out 4G spectrum auction plans, ZDnet UK (July 28, 2010), available at <http://www.zdnet.co.uk/news/mobile-working/2010/07/28/government-sets-out-4g-spectrum-auction-plans-40089674> (“The [U.K.] coalition’s SI [Statutory Instrument] is very close to that laid down by the Labour government in March, with notable differences being the lack of a government-mandated cap on spectrum holdings”); Explanatory Memorandum To The Wireless Telegraphy Act 2006 (Directions To Ofcom), Order 2010, 2010 No. Draft, Summary: Analysis and Evidence, at 6, available at http://www.opsi.gov.uk/si/si2010/draft/em/ukdsiem_9780111500767_en.pdf (“In contrast to previous solutions considered by the UK Government, at the present time, Ofcom would not be directed to introduce quantitative restrictions on holdings of particular frequencies (so-called ‘spectrum caps’)”). As explained in the Explanatory Memorandum that accompanied the elimination of spectrum caps, technology trends and broadband demand “reduce[d] [the] competition concerns” on which the original caps were based.” *Id.* at 11.

⁸¹ Michael Newlands, Big three operators happy with low-cost German auction, Policy Tracker (May, 26, 2010), available at <http://www.policytracker.com/search?Subject:list=Wireless%20broadband&Type=News%20Item>.

⁸² *Fourteenth Report* ¶ 153.

⁸³ *Thirteenth Report* ¶ 187.

competitive. Output is up dramatically, prices continue to decline, penetration has reached over 90% and is high among all demographics, investment continues to be extremely high (which is particularly extraordinary given the recent economic recession), innovation continues at breakneck speed, and quality of service is at record levels.

Indeed, the U.S. leads the rest of the world in every metric. U.S. customers have more choices than customers in other countries,⁸⁴ and U.S. customers use more voice minutes and more data than do those in any other country.⁸⁵ And, U.S. customers also pay lower prices than customers in other countries.⁸⁶ In addition, U.S. providers are leading the world in the wireless broadband revolution. The U.S. “ranks 1st in world 3G subscribers,” and it “led the world in 3G net adds in 2009.”⁸⁷ “While the U.S. accounts for only 6% of the total world’s total wireless subscribers, the U.S. has more than 21% of the worlds 3G subscribers.”⁸⁸ U.S. customers

⁸⁴ CTIA May 2010 Wireless Market Statistics, slide 6 (“Of the 26 OECD countries tracked, 12 have three or fewer competitors, 12 have four, and only the U.S. and Canada have more than five”); *Fourteenth Report*, Table 5 (showing that nearly three quarters of the U.S. population can choose among 5 or more competitors).

⁸⁵ *Fourteenth Report*, Table 40 (showing U.S. with average voice minutes of 829, nearly double that of the next closest country, Hong Kong at 447 average minutes); *see also id.* ¶ 362 (“U.S. mobile subscribers talked an average of 829 minutes per month on their mobile phones in the fourth quarter of 2008. This compares with 139 MOUs in Japan and an average across Western Europe of 158 MOUs, with estimated MOUs in individual European countries ranging from a low of 102 in Germany to a high of 246 in France.”); *see also* CTIA Wireless Facts, *available at* http://files.ctia.org/pdf/051710_-_Independent_Assessment_of_Wireless_Industry.pdf (“The U.S. has the highest MOUs per month per user and the lowest average revenue per minute of service out of the 26 OECD countries tracked by Bank of America Merrill Lynch” and “[t]he U.S. has the largest mobile data market and the most mobile Internet users than any other country”).

⁸⁶ *Fourteenth Report*, Table 40 (1994-2008 prices); Comments of CTIA, *Framework for Broadband Internet Service*, GN Docket No. 10-127, at 20 (filed July 15, 2010) (“CTIA Broadband Framework Comments”) (2009 prices).

⁸⁷ Chris Pearson, *The Mobile Broadband Evolution, The Changing World of Wireless*, at 4, 3G Americans.

⁸⁸ CTIA May 2010 Wireless Market Statistics, at 9.

purchase more than two times as many smartphones as the next closest country (China),⁸⁹ and U.S. customers are typically the first to have access to the latest technology.⁹⁰ Cutting edge devices are typically made available first in the U.S., and the U.S. is leading the world in deployment of next generation LTE services, as well as other types of mobile wireless broadband services, including WiMAX and MSS-based services.⁹¹ These remarkable successes are the direct result of intense rivalry among U.S. wireless providers.

The *Fourteenth Report* de-emphasizes these consumer-focused facts and places greater weight on newly devised metrics apparently designed to avoid the conclusion that the wireless marketplace is effectively competitive. But, as discussed below, even the Commission recognizes that these new metrics – such as accounting profits – are largely invalid and certainly irrelevant to the Commission’s intended clients, *i.e.*, customers.

1. *Output and Prices.* Despite extraordinarily high penetration levels (discussed below), the *Fourteenth Report* shows that subscribership continued to grow into 2009 for virtually all providers (with the exception of Sprint),⁹² voice usage continues to be strong (although consumers increasingly substitute text messaging, email, instant messaging, and VoIP),⁹³ text

⁸⁹ Chris Pearson, *The Mobile Broadband Evolution, The Changing World of Wireless*, at 4, 3G Americans.

⁹⁰ CTIA Broadband Framework Comments, at 11.

⁹¹ *Id.*, at 11 (“[A]lmost all of the ‘hottest’ and most innovative smartphones are first launched in the United States. These devices include the Apple iPhone, iPhone 3G, iPhone 3GS and iPhone 4; Apple iPad; Google G1, MyTouch and Nexus One; Blackberry Storm, Bold, Pearl, Tour and Curve 8900; Samsung Instinct; Palm Pre and Pixi; Amazon Kindle; Barnes & Noble Nook, and the EVO 4G from HTC.”); Chris Pearson, *The Mobile Broadband Evolution, The Changing World of Wireless*, at 4, 3G Americans (showing U.S. leading world in LTE deployment).

⁹² *Fourteenth Report*, Table 14 & ¶ 171. The report shows overall subscriber growth of 2.9 percent for the first quarter of 2009, which is lower than historical growth. *Id.*, Chart 19. But that is most likely attributable to the already high penetration rate (90%) and the impact of the economic downturn and corresponding decreased consumer spend on all goods and services.

⁹³ *Id.* ¶ 176 (citing data submitted by CTIA).

messaging continues to increase by hundreds of billions every six months,⁹⁴ and broadband data usage is increasing exponentially.⁹⁵ Moreover, output is high across all demographics and types of service plans.⁹⁶ The Comments of CTIA that will be filed in this proceeding show that these trends continued into 2010.

At the same time, prices are lower – already almost the lowest in the world – continue to decline. According to the *Fourteenth Report*, the per minute price of voice services fell from \$0.41 cents in 1994 to about a nickel. More recent data from CTIA shows that it continued to fall in 2009 to \$0.04.⁹⁷ Prices for text messaging fell by more than *half* in 2008 (\$0.011) compared to 2007 (\$0.025).⁹⁸ And monthly broadband prices have remained constant or have declined, even as consumers continue to use exponentially *more* data services every month, resulting in significant per unit declines in prices.⁹⁹ Not surprisingly, the consumer price index for wireless shows decreasing prices, while overall consumer prices have been increasing.¹⁰⁰

⁹⁴ *Id.* ¶ 178-180 (citing data submitted by CTIA).

⁹⁵ *Id.* ¶¶ 181-184; *See also* Cisco White Paper, Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2009-2014 (Feb. 9, 2010) (predicting exponential growth in data traffic from 2009 through 2014); *AT&T Tees Up the 3G Mobile Broadband Network in the Greenbrier and Lewisburg*, CNNMoney.com (July 26, 2010), available at <http://money.cnn.com/news/newsfeeds/articles/prnewswire/CG40353.htm> (“Wireless data traffic on the AT&T network grew more than 5,000 percent from 2007 to 2009, largely attributed to the increasing popularity of advanced smartphones and the performance of AT&T’s 3G network, the nation’s fastest.”); Jennifer Johnson, *Droid X Users Consume 5X More Data*, Hothardware (July 22, 2010) (quoting Verizon as stating that “Droid X owners . . . use five times the amount of data [compared to] other smartphone owners”), available at <http://hothardware.com/News/Droid-X-Users-Consume-5X-More-Data/>.

⁹⁶ *Fourteenth Report* ¶ 163-64.

⁹⁷ *Fourteenth Report*, Table 19 (showing 1993 to 2008 per minute voice prices); CTIA Broadband Framework Comments, at 20 (showing 2009 per minute voice prices).

⁹⁸ *Fourteenth Report*, Table 20 (citing CTIA data and Commission estimates).

⁹⁹ As discussed in Part II.A, below, prices for broadband plans have remained steady or decreased. At the same time, as noted above, broadband usage is growing exponentially.

¹⁰⁰ *Id.* ¶ 186 (“From 2007 to 2008, annual Cellular CPI decreased . . . while the overall CPI

Although these developments should be cause for celebration, the *Fourteenth Report* puts as dour a face on them as it can. Remarkably, the Commission begins by discussing total revenues per voice minute (“RPM”), and bemoans that this metric rose for the first time since 1994, by nine percent, to \$0.07. Although RPM may have been a useful proxy for per unit voice prices years ago when voice services were virtually the only wireless services offered, it is obviously of little, if any, value today, given the explosion of data and messaging services, which account for a large and increasing proportion of overall revenues. It is no wonder the Commission all but concedes, as it must, that RPM has become completely irrelevant as a measure of per-minute voice prices.¹⁰¹ The only relevant measure – *voice* revenues per voice minute – were in 2008 at a record low (\$0.05), and continued to decline in 2009 to \$0.04. That is the lowest among 26 OECD countries followed by Bank America Merrill Lynch.¹⁰²

The *Fourteenth Report* also refuses to take a position on broadband pricing – perhaps because the news unquestionably would be good. The Commission claims that it lacks the data to make any determinations about pricing trends.¹⁰³ But, as noted, elsewhere in the *Fourteenth Report* the Commission shows that wireless broadband data usage has been increasing exponentially as pricing plans remain constant or are falling. Simple mathematics is all that is needed to understand that this cannot have happened unless there have been dramatic declines in per-unit prices, however one defines the units. Thus, it is puzzling why the Commission fails to

increased. . . . The Cellular CPI has declined by 35.8 percent since December 1997”).

¹⁰¹ *Id.* ¶ 189 (“As the contribution of data services to total revenues has increased, RPM has become an increasingly inaccurate measure of the pricing of mobile voice service”). This, of course, is an understatement. Not only is RPM inaccurate, it is biased because it is inaccurate in only one direction – upward.

¹⁰² *Id.* Table 40 (2008 per minute voice prices); CTIA Broadband Framework Comments, at 20 (2009 per minute voice prices).

¹⁰³ *Fourteenth Report* ¶ 193.

note this clear fact.

2. *Penetration and Net Adds.* The national and regional penetration rates presented in the *Fourteenth Report* are also remarkable. Overall penetration rates as of year-end 2008 were over 90%,¹⁰⁴ and “[i]n 53 of the 160 EAs, the penetration rates exceeded 90 percent, up from 24 EAs at the end of 2007,” while “[o]nly two EAs, with a combined population of just 415,000, had penetration rates under 70 percent.”¹⁰⁵ In addition, “[s]everal EAs . . . had penetration rates exceeding 100 percent, which is likely due to subscribers having more than one device.”¹⁰⁶ The report further confirms that penetration is high among all age groups (*e.g.* 89 percent for ages 65 and over up to 96 percent for ages 18-24).¹⁰⁷ As shown in the CTIA comments filed in this proceeding, penetration rates increased even further for 2009. And, providers continue to rapidly upgrade and expand their networks. In July 2010 alone, AT&T upgraded and expanded its network in several areas, including rural areas.¹⁰⁸

Here again, however, the Commission focuses on data that does not tell the true story, namely broadband subscribership data from Form 477. That data shows that, as of 2008, there

¹⁰⁴ *Id.* ¶ 156.

¹⁰⁵ *Id.* ¶ 170.

¹⁰⁶ *Id.*

¹⁰⁷ *Id.* Chart 17.

¹⁰⁸ *See, e.g.*, AT&T Press Release, AT&T Brings 3G Mobile Broadband Network to del Rio (July, 23, 2010), *available at* <http://www.att.com/gen/press-room?pid=18169&cdvn=news&newsarticleid=30988&mapcode=Wireless>; AT&T Press Release, AT&T Brings 3G Mobile Broadband Network to Hunt County (July, 21, 2010), *available at* <http://www.att.com/gen/press-room?pid=18143&cdvn=news&newsarticleid=30972&mapcode=Wireless>; AT&T Brings 3G Mobile Broadband Network to Sulphur Springs (July, 15, 2010), *available at* <http://www.att.com/gen/press-room?pid=18124&cdvn=news&newsarticleid=30955&mapcode=Wireless>; AT&T Brings 3G Mobile Broadband Network to Terre Haute, Indiana (July, 1, 2010), *available at* AT&T Brings 3G Mobile Broadband Network to Terre Haute, Indiana.

were 25 million Americans that subscribed to a wireless broadband plan.¹⁰⁹ But even the Commission acknowledges that this figure is much higher now. Indeed, the *Fourteenth Report* reveals elsewhere (¶ 162) that “mobile wireless data penetration rates . . . were 180 million mobile data subscribers in 2009, which translates into a penetration rate of 63%.” This rapid acceleration is itself significant – far more so than one would glean from the *Fourteenth Report* – but the *Fourteenth Report* understates the number of users in 2008, because it does not count customers that have broadband capable devices and use broadband services on a pay-as-you-go basis. In that regard, the Form 477 data indicate that 86 million customers in 2008 had a broadband capable device,¹¹⁰ the vast majority of which almost certainly use broadband services.

3. *Investment.* Investment by wireless providers is another success story. In 2009, U.S. wireless providers invested more than wireless providers in the five largest European countries combined.¹¹¹ But, once again, the Commission puts a negative spin on positive data. It ignores research and development and focuses solely on capital expenditures (*e.g.*, network upgrades and expansion), and it claims that, by some crabbed measures, capital expenditures have been decreasing.¹¹² These claims are misleading and, in any event, miss the point.

First, the data in the *Fourteenth Report* clearly show that capital expenditures have remained remarkably strong in the wireless industry, notwithstanding the severe recession and despite the fact that investment in other industries has fallen. AT&T, T-Mobile, and Verizon all *increased* their capital expenditures from 2007 through 2009, and the *Fourteenth Report* fails to

¹⁰⁹ *Id.* Chart 10. These data are new and, as the Commission points out, are not “directly comparable to mobile wireless high speed connections reported for earlier dates.” *Id.* ¶ 158.

¹¹⁰ *Id.* ¶ 158.

¹¹¹ CTIA May 2010 Wireless Market Statistics, at 8 (“In 2009, U.S. wireless providers invested \$20.4 billion in their currently operational networks alone, compared to \$17.9 billion invested by wireless providers in the five largest European countries.”).

¹¹² *Fourteenth Report* ¶¶ 210-13.

mention that both Leap Wireless and MetroPCS also significantly increased capital expenditures between 2007 and 2009 by 39% (Leap) and 8% (MetroPCS), or that Clearwire increased its capital expenditures over that time period by 223%.¹¹³ Of course, even if that were not the case, there is no reason to expect capital expenditures to increase by the same amount year after year. Capital expenditures tend to be “lumpy.” Providers make significant expenditures to upgrade and expand their networks in one year (*e.g.*, perhaps because a new generation of technology has just been introduced), and then focus the next year on signing up customers and integrating those new facilities into their existing networks, and then make additional capital expenditures later, and so on. Minor variations from year to year thus should not be surprising, much less an indication of declining competition.

In any event, the data show that the decrease in overall capital expenditures may be attributable to a single provider – Sprint. Buried at the very end of the “investment” section, Chart 33 shows that capital expenditures have consistently increased since 2006 for AT&T, Verizon and T-Mobile. Sprint is the only provider that, according to the data in the *Fourteenth Report*, has reduced capital expenditures since 2006. As AT&T has previously noted, Sprint, for reasons of its own, has chosen not to invest in its own network and is instead reselling services provided by Clearwire – but the company-specific actions by Sprint provide no reason to question the overall industry’s commitment to compete on the basis of upgraded networks.

The *Fourteenth Report* also misinterprets the CTIA data on which it relies. It states that the “data from CTIA suggests that . . . capital investment has been declining over the past four

¹¹³ See Leap Wireless 2009 and 2008 Annual 10Ks, available at <http://phx.corporate-ir.net/phoenix.zhtml?c=95536&p=quarterlyearnings>; MetroPCS 2009 and 2008 Annual 10Ks, available at <http://investor.metropcs.com/phoenix.zhtml?c=177745&p=quarterlyearnings>; Clearwire 2009 and 2008 Annual 10Ks, available at <http://investors.clearwire.com/phoenix.zhtml?c=198722&p=irol-newsArticle&ID=1263229&highlight=>.

years,”¹¹⁴ but as CTIA explains, that is not so. The data that CTIA collects and reports include only those expenditures on items that were put into service in that given year. Thus, for example, such data do not reflect the billions of dollars of investments made by providers to upgrade to LTE and other not-yet-activated upgrades and expansions. It also does not include the more than \$33 billion in capital expenditures that providers made to purchase spectrum in the last two auctions.¹¹⁵ Even with these limitations, as CTIA explains in its comments, incremental capital expenditures for 2009 were higher than in 2008.

4. *Service Quality.* The *Fourteenth Report* shows that quality of service is at record high levels, with the number of dropped calls at record low levels.¹¹⁶ Moreover, it shows that competition has driven providers to make investments to improve service quality such that all providers are now near parity in terms of service quality.¹¹⁷ A recent Commission survey found that 92 percent of customers were satisfied with their mobile wireless service.¹¹⁸ AT&T has been a leader on this front even though it has experienced far greater growth in data services than any other provider. For example, a recent report by the Yankee Group found that 73% of AT&T’s iPhone users are “very satisfied” with AT&T’s network, whereas only 69% of all smartphone customers say they are “very satisfied” with their mobile networks.¹¹⁹

¹¹⁴ *Fourteenth Report* ¶ 210.

¹¹⁵ CTIA Broadband Framework Comments, at 21, n.46.

¹¹⁶ *Fourteenth Report* ¶¶ 222-223.

¹¹⁷ *Id.* ¶ 223.

¹¹⁸ John Horrigan, Ellen Satterwhite, FCC Survey, *Americans’ perspectives on online connection speeds for home and mobile devices*, at 1, available at http://www.fcc.gov/Daily_Releases/Daily_Business/2010/db0601/DOC-298516A1.pdf.

¹¹⁹ David Goldman, *Most iPhone users love AT&T*, CNN Money.com (July 23, 2010), available at http://money.cnn.com/2010/07/23/technology/iphone_4_att/index.htm?source=cnn_bin&hpt=Sbin.

Numerous objective analyses confirm these high consumer satisfaction levels. “The America Customer Satisfaction Index reported that their Overall Business Quality Index from 2004 through 2010 increased only 2% while the wireless industry improved 10.8% in that same span. In 2010, the wireless industry set an all time high in this index for the second straight year. According to JD Power, network quality, retail sales and customer service have all improved year-over-year from 2009 to 2010. The Better Business Bureau reports that, since 2004, the monthly complaint rate for the wireless industry has fallen 22%. And the number of FCC complaints related to marketing, advertising, contracts, early termination fees, network quality, billing, and rates was significantly lower in 2009 than they were in 2008, even as subscribership increased.”¹²⁰ The number of complaints for the first three quarters of 2009 on non-Telephone Consumer Protection Act related issues was down almost 9 percent from the same period in 2008 – there is less than one such complaint per day for every *five million* customers.¹²¹

5. “*Profitability.*” This year, the Commission for the first time presents (¶¶ 215-224) various measures of wireless industry accounting profits. The Commission acknowledges, however, that accounting profits have extremely limited value because they differ in many respects from any “true measure of economic profit.”¹²² Accordingly, the Commission explains that it is not drawing any conclusions from the absolute level of its accounting profit metrics, but

¹²⁰ AT&T Public Policy Blog, “The U.S. Wireless Industry – It’s All About the Consumer,” July 27, 2010, available at <http://attpublicpolicy.com/government-policy/the-u-s-wireless-industry-%E2%80%93-it%E2%80%99s-all-about-the-consumer/>.

¹²¹ CTIA Wireless Facts, at 1, available at http://files.ctia.org/pdf/051710_-_Independent_Assessment_of_Wireless_Industry.pdf. Telephone Consumer Protection Act issues are related to calls from telemarketers and not typically caused by the underlying service provider.

¹²² *Fourteenth Report* ¶ 215.

explains that these metrics may be useful for “compar[ing] the performance of mobile wireless segments of different communication[s] providers.”¹²³ The accounting metrics used by the Commission, however, are not useful for even that limited purpose.

The Commission begins its presentation by discussing the problems with using EBIT – earnings before interest and taxes – for anything. The Commission explains, for example, that “as interest payments on debt and corporate income taxes are generally recurrent cash flow obligations, some experts argue that these measures may not always be good estimates of operating cash flow” and that “[f]ederal and [s]tate[] income taxes can be over one-third of pre-tax income and they are deducted [from] most profit formulas.”¹²⁴ Thus, because EBIT does not account for these significant expenditures that vary widely among firms, EBIT metrics cannot produce apples to apples comparisons among firms, and the Commission explains that “[w]e do not discuss EBIT data in this *Report*.”¹²⁵

But the EBITDA metrics – earnings before interest, taxes, depreciation, and amortization – the *Fourteenth Report* uses has all of the same flaws as EBIT. In addition, EBITDA has even more severe problems. As the *Fourteenth Report* explains, depreciation and amortization – the two additional amounts that are left out of the EBITDA metric – are two of the largest costs in highly capital intensive industries like the wireless industry. Depreciation relates to assets such as the tens of thousands of cell towers deployed throughout the country, and amortization reflects annual payments on long term investments, including capital expenditures, which the Commission recognizes are extremely high in the wireless industry.

Consequently, comparing firms within an industry using EBITDA can be valid only if

¹²³ *Id.*

¹²⁴ *Id.* ¶ 216.

¹²⁵ *Id.*

one assumes that all firms have made similar capital expenditures (which are paid for via depreciation and amortization), so that omitting depreciation and amortization from the profits metric makes no difference. The *Fourteenth Report* itself concedes this point: “EBITDA can be a useful measure of [profits]” only “[t]o the extent that capital expenditures are proportionately similar across firms and over time.”¹²⁶ But the *Fourteenth Report* then goes on to use EBITDA without acknowledging that different wireless providers have indeed incurred different capital expenditures that are proportionately quite different, as it showed elsewhere in its report.¹²⁷ Indeed, the *Fourteenth Report* recognizes that AT&T and Verizon have recently made capital expenditures that far exceed that of Sprint (which has declining capital expenditures) or T-Mobile, and thus it should not be surprising that AT&T and Verizon have higher EBITDAs (which reflect only the earnings from those capital expenditures and ignore the costs of these expenditures) than Sprint or T-Mobile. For these reasons, the *Fourteenth Report’s* comparisons of EBITDA per Subscriber and EBITDA Margins (*i.e.*, EBITDA divided by revenue) are meaningless, because they do not account for the significant differences in interest, taxes, depreciation and amortization among the firms.¹²⁸

¹²⁶ *Id.* ¶ 217.

¹²⁷ The *Fourteenth Report* itself documents (¶ 213 & Chart 33), for example, that as Clearwire, AT&T, Verizon and others are increasing their capital expenditures, Sprint is reducing its expenditures, and that (¶ 219) that there can be significant differences among providers that may reflect “underlying factors including different characteristics of service and product offerings, different customer preferences, different network designs and capabilities, different cost structures, [and] scale economies.”

¹²⁸ In addition, “[t]he differences in EBITDA per subscriber across providers may reflect many underlying factors including different characteristics of service and product offerings, different customer preferences, different network designs and capabilities, different cost structures, scale economies, and the degree of competitive rivalry. The changes in EBITDA per subscriber for individual providers can also reflect changes particular to the provider; for example, acquisitions of networks in mergers or changes in service and product offerings over time. It is possible that some of the correlated changes across providers reflect macroeconomic effects on demand.” *Fourteenth Report* ¶ 219.

The *Fourteenth Report* computes EBITDA minus CAPEX per subscriber in an attempt to capture the impact of the vastly different capital expenditures made by the different providers. But this adjustment is insufficient. It still omits interest, taxes and depreciation, all of which the *Fourteenth Report* notes can be significantly different among firms. The *Fourteenth Report* further admits that “EBITDA minus CAPEX does not account for purchases of spectrum licenses, a significant expense of mobile wireless providers,” which has also varied greatly among wireless providers.¹²⁹

More importantly, the EBITDA minus CAPEX metric does not properly capture each firm’s capital expenditures. The *Fourteenth Report* appears to have simply computed each provider’s annual EBITDA and then subtracted each provider’s capital expenditures for that year. But this calculation fails to capture the fact that capital expenditures are “lumpy” long term investments – providers may make large capital expenditures in one year and then make much lower ones in subsequent years, while others have the opposite pattern. Furthermore, because *today’s* Depreciation & Amortization pays for *yesterday’s* capital expenditures, there is no reason to expect that the current CAPEX being subtracted is in any particular proportion to the current Depreciation & Amortization being ignored.

For example, Chart 34 shows that in 2007 AT&T had the second highest EBITDA among the firms in the comparison, but Chart 35 shows that in 2006 AT&T had the *lowest* EBITDA minus CAPEX. That merely shows that AT&T happened to have extraordinarily high levels of capital expenditures in 2006 (as shown elsewhere in the report (Chart 33)). When AT&T later reduced its capital expenditures in 2007, its EBITDA minus CAPEX rose to the highest, and then in 2008 when it increased CAPEX again, it declined to second place. These data thus reflect

¹²⁹ *Fourteenth Report* ¶ 218.

only AT&T's lumpy CAPEX over the past few years, not that it was more or less "profitable" than other providers during those years.

Finally, the arbitrariness of the EBITDA, EBITDA minus CAPEX, and EBITDA margin metrics is further illustrated by comparing these statistics for AT&T and Verizon, both of which likely had the most similar capital expenditures over the past few years. In each case, the metric for Verizon significantly exceeds that for AT&T. This may be due to many factors, including for example that portions of Verizon Wireless' earnings and investment costs may be owed or paid by its equity partner, Vodafone, and thus reflected differently in Verizon's EBITDA-based metrics. Examining other industries likewise confirms the arbitrariness of the metrics. For example, in the first quarter of 2010, Ford had an EBIT margin that was more than *double* that of GM, but no reasonable analyst would rely on such a statistic to suggest that Ford has market power or that the automobile industry is not competitive.¹³⁰

6. *ARPU Metrics.* Finally, the *Fourteenth Report* raises questions about changes in "ARPU" – the average revenue received by a provider per customer.¹³¹ ARPU data can be a useful metric when properly examined in context. But if a growing proportion of a provider's customers are purchasing messaging and broadband services in addition to their voice services, ARPU may increase because each customer is now purchasing more services from the provider, even if the per unit prices of voice, messaging and broadband services have all declined.¹³²

¹³⁰ Joann Muller, *GM And Ford Take Different Paths To Profit*, Forbes.com (May 18, 2010), available at <http://www.forbes.com/2010/05/17/ford-general-motors-chrysler-business-auto-gm.html>. (Ford's "operating margin was twice GM's EBIT margin, putting it among the industry's best performers.").

¹³¹ *Fourteenth Report* ¶¶ 202-204.

¹³² As a matter of basic mathematics, ARPU will increase as more users purchase a product. For example, if a provider has 10 customers and 4 of them purchase a \$30 data plan (totaling \$120), then the ARPU would be \$12 (\$120 divided by ten customers). If, in the next year, 8 customers purchase a \$25 data plan, ARPU will rise to \$20, even though the price of the data plan has

Here, the *Fourteenth Report* shows that, according to CTIA data, wireless ARPU declined by about \$2.59 from 2004 to 2007 and remained essentially flat from 2007 to 2008.¹³³ Updated data from CTIA shows that wireless ARPU dropped precipitously from 2008 to 2009 by nearly \$2.¹³⁴ Yet, as shown above, customers continue to purchase more voice, messaging and broadband services than ever before. As a matter of basic mathematics, increased adoption and use can produce declining ARPUs only if prices for voice, messaging, and broadband are falling significantly faster.¹³⁵ The ARPU metric thus once again confirms that competition in the wireless marketplace is providing customers with far more services for the same or lower prices.

III. PROVIDER AND CUSTOMER CONDUCT FURTHER CONFIRMS THAT THE WIRELESS MARKETPLACE IS INTENSELY COMPETITIVE.

The *Fourteenth Report* confirms that providers and consumers are behaving in a manner that can only be consistent with intense competition. As discussed below, providers are constantly battling to provide the most desirable bundles of service with the best combination of price, features, coverage, speed, and quality. Providers also continue to make extraordinary investments to upgrade and expand their networks and to develop innovative technologies and service offerings. Consumers are better informed than ever about their alternatives, and they

fallen by \$10.

¹³³ *Id.* Chart 29.

¹³⁴ CTIA Broadband Framework Comments, at 18 (“As of the end of 2009, the average wireless consumer’s bill was \$48.16, in spite of explosive growth in other provided services included as part of the bill such as Internet access, SMS texting, MMS and other new services.”).

¹³⁵ Consider the case of a provider with a single customer. If the customer originally purchased only a voice plan, and then later added a messaging plan and broadband plan, that customer’s bill (ARPU) will remain the same or decline only if the combined voice, messaging and broadband plans are priced at the same level as the customer’s original voice plan, which means that the prices for each individual component of the service must be lower. Similarly, if the customer originally purchased a voice, messaging and broadband plan, but then substantially increase the use of those services while paying the same amount, then the per unit price for those services must have declined.

readily vote with their feet when they believe another provider will offer them better value.

A. Provider Conduct Confirms That the Wireless Marketplace Is Highly Competitive.

When examining provider conduct to assess the competitiveness of a marketplace, the Commission assesses the extent to which providers react to price and non-price changes in the offerings of other providers, the extent to which they are investing and innovating to keep up with or surpass their rivals, and the extent to which they are investing in advertising and employing other methods of winning customers from their competitors. In the *Fourteenth Report*, the Commission examined both price rivalry and non-price rivalry, the latter of which includes network investments, advertising and retailing, and handset/application offerings. By these metrics, the provider conduct data presented in *Fourteenth Report* – as well as subsequent data – overwhelmingly establishes that the wireless marketplace is highly competitive.

1. Price Rivalry Is Intense In The Wireless Industry.

As shown in Part II, above, wireless providers are continuing to provide more, better and faster services at lower prices. The *Fourteenth Report* separately addressed pricing rivalry for postpaid services and prepaid services and found substantial evidence of intense rivalry.

First, the *Fourteenth Report* details how providers compete by seeking to “further differentiate[] their service plans by attaching additional features to existing plans, without changing core components such as the monthly recurring charge” to give consumers “more value for their money.”¹³⁶ For example, the report notes AT&T’s new bundles that include the “A-List” calling feature that allows customers to designate a list of domestic telephone numbers – mobile or landline – on any network that the customer will be able to call without using any of his minutes allowance. It also discusses the similar innovative offerings from Verizon, Sprint,

¹³⁶ *Fourteenth Report* ¶ 90.

and T-Mobile.¹³⁷ In addition, although AT&T has had a “bring your own phone” option for years, the report explains that in the year studied Verizon and T-Mobile began offering such options as well.¹³⁸

More generally, however, the *Fourteenth Report* shows that wireless providers are constantly offering customers better handsets and devices, more applications, broader coverage, faster speeds, improved reliability, and better customer service, all at the same or lower prices.¹³⁹ In that regard, the *Fourteenth Report* documents wireless competitors’ pricing rivalries. The report shows, for example, that T-Mobile introduced significant reductions to its unlimited voice and data plans during this period, and that AT&T and Verizon both responded shortly thereafter with their own “significant” “price cuts.”¹⁴⁰ The report documents similar aggressive pricing competition for prepaid services. It explains, for example, that providers initially offered only “European-style”¹⁴¹ limited-minute pay-as-you-go prepaid plans, but intense competition led to the introduction of unlimited prepaid plans. Prices for these plans subsequently plummeted: “[O]ne analyst estimated that [prices for] all-you-can-eat [prepaid] plans have dropped by as much as 55 percent since the first unlimited national flat-rate calling plan was launched by Verizon Wireless in . . . 2008.”¹⁴²

¹³⁷ *Id.*

¹³⁸ *Id.* ¶ 97. The *Fourteenth Report* also confirms that wireless roaming average revenues continue to fall. *Id.* Table 21. Indeed, although roaming minutes increased significantly from 2007 to 2008, total revenues were down. *Id.* The *Fourteenth Report* purports to be concerned that total roaming minutes have increased by less than overall minutes. *Id.* ¶ 197. But that merely confirms that providers are continuing to build out their networks and are thus increasingly relying on their own facilities rather than roaming arrangements.

¹³⁹ *Id.*

¹⁴⁰ *Id.* ¶ 92.

¹⁴¹ *Id.* ¶ 99.

¹⁴² *Id.* ¶ 102.

All of these facts are strongly indicative of effective competition. The *Fourteenth Report*, however, instead emphasizes that AT&T's and Verizon's prices for certain unlimited postpaid plans were slightly higher than those of Sprint and T-Mobile. But pricing competition does not mean identical prices. As the analysts cited in the *Fourteenth Report* correctly point out (¶ 92), AT&T and Verizon offer premium services – broader coverage, higher speeds, and higher service quality – and they would therefore be expected to charge slightly higher prices. The more telling fact is that AT&T and Verizon are obviously reacting to price reductions by their rivals.

Moreover, the *Fourteenth Report* leaves out that AT&T has been a leader in cutting prices for other service plans. For example, AT&T's least expensive mass market individual voice plan is \$39.99 per month, and includes 450 Anytime minutes, a subsidized handset, 5000 Night and Weekend minutes, unlimited calls to other AT&T mobile handsets, and – unlike competing offers from T-Mobile and Sprint – Roll Over minutes. AT&T also offers seniors a \$29.99 plan that includes a subsidized handset, 200 monthly minutes, 1000 night and weekend minutes, and unlimited calls to other AT&T mobile handsets, neither of which T-Mobile or Sprint offer. And more recently (after the period covered by the *Fourteenth Report*), AT&T again led the industry by cutting prices for data plans – offering its iPhone and other smartphone users a \$15 plan for customers that use less than 250 megabytes of data each month and a \$25 plan for the 98 percent of its customers that use less than 2 Gigabytes of data.¹⁴³

2. Non-Price Rivalry.

The *Fourteenth Report* separately examines “non-price rivalry,” which is the extent to

¹⁴³ AT&T Press Release, *AT&T Announces New Lower-Priced Wireless Data Plans to Make Mobile Internet More Affordable to More People* (June 2, 2010), available at <http://www.att.com/gen/press-room?pid=17991&cdvn=news&newsarticleid=30854&mapcode=financial>.

which providers have invested in “(1) network upgrades; (2) product information and perception, which include[s] advertising and marketing; and (3) downstream product differentiation, including handset/device and application offerings.”¹⁴⁴ Again, these metrics show that the wireless marketplace is remarkably competitive.

Network Upgrades. The *Fourteenth Report* documents in detail the continued extraordinary investments in network upgrades made by wireless providers, and recent reports confirm that such investments and upgrades continue. The *Fourteenth Report* shows, for example, that “[i]n 2006, EV-DO networks covered 62.6 percent of the U.S. population” and that “[t]oday, they cover nearly all Americans,”¹⁴⁵ HSPA coverage increased from 20 percent coverage in 2006 to more than 76 percent coverage in 2009,¹⁴⁶ and “mobile WiMAX networks, which were effectively non-existent in the *Thirteenth Report*, now cover approximately 28 million people.”¹⁴⁷

Between the *Thirteenth* and *Fourteenth Reports*, Verizon added 44 million POPs to its 3G network, AT&T added 125 cities to its HSPA network with the HSPA 7.2 software upgrade, and T-Mobile expanded its HSPA coverage from 13 markets to 176 cities and began upgrading its HSPA network to HSPA+.¹⁴⁸ Similarly, “[a]s of September 2009, Clearwire’s WiMAX service was available in 14 markets covering 10.1 million POPs. Since that time, Clearwire has expanded the WiMAX network to an additional 16 markets and expects to reach 120 million

¹⁴⁴ *Fourteenth Report*, ¶ 104.

¹⁴⁵ *Id.* ¶ 123.

¹⁴⁶ *Id.*

¹⁴⁷ *Id.* ¶ 122.

¹⁴⁸ *Id.* ¶ 116.

POPs by the end of 2010.”¹⁴⁹ Regional operators also expanded and upgraded their broadband networks: for example, Leap Wireless increased its 3G coverage by 36 percent and U.S. Cellular increased its coverage from five markets to 75 percent of its customer base.¹⁵⁰

As the report notes, providers of all sizes are spending many additional billions of dollars to deploy next-generation broadband networks. As discussed above, AT&T, Verizon, and MetroPCS are all investing billions to upgrade their networks to next generation LTE technology; Cox is also in the process of testing its LTE network ahead of a planned deployment later next year; Clearwire continues to spend more than a billion dollars per year to increase the coverage of its WiMAX network; and satellite companies are spending billions of dollars to roll-out of a combined terrestrial (LTE) and satellite based broadband wireless service.

Moreover, providers continue to expand Wi-Fi networks throughout the U.S, and are experience explosive growth in the use of those networks. For example, “AT&T owns and operates the nation’s largest Wi-Fi network, with more than 20,000 U.S. hotspots at popular locations like retail stores, restaurants and coffee shops.”¹⁵¹ In the second quarter of 2010 “AT&T handled 68.1 million connections on its public Wi-Fi network – up from 15 million connections in the second quarter of 2009.”¹⁵² So far, AT&T customers “made 121.2 million connections in the first half of 2010, already far surpassing the 85.5 million connections made in all of 2009.”¹⁵³

¹⁴⁹ *Id.* ¶ 117.

¹⁵⁰ *Id.* ¶ 114.

¹⁵¹ Press Release, *Use of AT&T’s Wi-Fi Network Grows to More Than 68 Million Connections in the Second Quarter* (July 22, 2010), available at <http://www.att.com/gen/press-room?pid=18147&cdvn=news&newsarticleid=30973&mapcode=consumer>.

¹⁵² *Id.*

¹⁵³ *Id.*

Advertising and Retailing. The *Fourteenth Report* also demonstrates that non-price rivalry through advertising and marketing remains extraordinarily high. The Commission tries to paint this in a negative light by emphasizing that the more than \$3 billion that providers spent on advertising may have decreased slightly from 2007 to 2008, and the amount spent by AT&T and Verizon purportedly decreased slightly from 2007 to 2009.¹⁵⁴

This is a non-issue. The data to which the *Fourteenth Report* refers (¶ 128) show a decline in advertising from 2007 to 2008 from \$3.7 billion to \$3.4 billion. The fact that the wireless industry overall may have slightly reduced spending on advertising as the economy fell into a severe recession should not be terribly surprising or concerning. To the contrary, the surprising thing is how robust the wireless industry's advertising has remained during the recession: as the *Fourteenth Report* later admits, the wireless industry reduced its spending far less than other industries, and the wireless industry moved up from 7th to 4th place among the industries that spend the most on advertising. Moreover, in 2009 Verizon and AT&T were the 2nd and 3rd largest purchasers of advertising among all U.S. firms, and Sprint was 7th.¹⁵⁵

In any event, the use of 2007 as the starting point for its analysis skews the results because the 2007 advertising spend was abnormally high, due to several factors. First, the economy was still booming in 2007. Also, in 2007, AT&T dramatically increased its advertising expenditures because of the rebranding of Cingular Wireless as AT&T Wireless, as well as the initial roll-out of the first iPhone. Taking into account that 2007 presented unique circumstances, AT&T has significantly increased its advertising spend each year from 2006 through 2009 – as noted, in 2009, AT&T was the 3rd largest purchaser of advertising in the U.S. behind only

¹⁵⁴ *Id.* ¶ 128.

¹⁵⁵ CTIA Broadband Framework Comments, at 23 (providing data from TNS Media Intelligence).

Verizon (2nd) and Procter & Gamble (1st).¹⁵⁶

Equally important, in this instance a drop in absolute spending does not indicate a drop in advertising. As a result of the recession, advertising prices for 2008 and 2009 plummeted,¹⁵⁷ which means that even if the wireless industry spent slightly less in absolute dollars, they purchased *more* advertising overall.

Beyond advertising, the *Fourteenth Report* recognizes that investments in retail distribution of products and services provides further evidence of competition in the wireless marketplace. The *Fourteenth Report* summarizes the myriad distribution points for wireless services – the Internet, provider stores, handset manufacturer stores, Best Buy, Wal-Mart, Target, Costco, RadioShack, and many more. Relevant here, AT&T recently made very substantial additional investments to upgrade AT&T-branded retail outlets to provide customers with an even better experience.¹⁵⁸

Handsets and Applications. The *Fourteenth Report* recognizes that another indication of strong competition among providers is the extent to which they seek to differentiate their products by offering more desirable handsets, operating systems and applications.¹⁵⁹ Here, the statistics set forth in the *Fourteenth Report* speak for themselves. The report shows that there have been *sixty-seven* smartphones launched by more than *two dozen different* U.S. providers

¹⁵⁶ *Id.*

¹⁵⁷ See, e.g., Jeff Creps, *Advertising Prices Are Down, Time to Buy?*, SDNN (Dec. 14, 2009), available at <http://www.sdn.com/sandiego/2009-12-14/blog/sponsored-blogs/biz-soup/advertising-prices-are-down-time-to-buy> (“a JPMorgan study that looked at the price change of ads across all media in 2009. Of those that were polled in the study, at least 65% of respondents said that the cost of advertising in their desired media had gone down in 2009”).

¹⁵⁸ See, e.g., AT&T Press Release, *AT&T Completes Store Makeover in Time for Back-to-School Shopping* (July, 29, 2010), available at <http://www.att.com/gen/press-room?pid=18183&cdvn=news&newsarticleid=30995>.

¹⁵⁹ *Fourteenth Report* ¶ 135.

from March 2008 through January 2010, using a variety of operating systems.¹⁶⁰ And, as discussed above, there have been numerous additional new smartphones released since then, including the iPhone 4, HTC EVO 4G, Droid X, Droid Incredible, among others. By the third quarter of 2009, more than 44 percent of all handset sales were smartphones and 50 percent of all handset upgrades were smartphones (up from 27% and 29%, respectively in the second quarter of 2008).¹⁶¹

Innovative handsets, however, are only part of the story. Providers and manufacturers in the U.S. are vigorously competing for a piece of the emerging devices marketplace. This intense competition has spurred a flurry of e-readers, netbooks, GPS turn-by-turn devices, and digital picture frames, and this competition recently produced an entirely new category of wireless devices with the introduction of the iPad in the spring of 2010.¹⁶² And, with these innovative new devices comes more innovation in network and service offerings. AT&T, for one, has developed innovative technologies and service offerings to allow many of these devices (*e.g.*, Amazon Kindle) to come with seamless wireless connectivity out-of-the-box and customers are never required to interact with or directly pay AT&T. The iPad provides another example. With the introduction of the iPad, AT&T developed and deployed an innovative way for consumers to

¹⁶⁰ *Id.* App. C, Table C-5: Selected Smartphone Launches in 2008-2009.

¹⁶¹ *Id.* ¶ 137.

¹⁶² In July 2010, AT&T announced “that nearly 3.4 million connected devices have been added to the AT&T network in the past three quarters, including roughly 900,000 connected devices in the second quarter. The total number of connected devices on the AT&T network – both emerging consumer devices and machine-to-machine – is nearly 6.7 million.” *See, e.g., AT&T Press Release, AT&T Adds Nearly 900,000 Connected Devices to Network in 2Q; Now Services Nearly 6.7 Million Connected Devices (July 23, 2010), available at* <http://www.att.com/gen/press-room?pid=18149&cdvn=news&newsarticleid=30975>. Overall, “AT&T has certified more than 850 specialty consumer and machine-to-machine devices – such as eReaders, netbooks, digital photo frames, personal navigation devices, home security monitoring and smart grid devices – for use on its wireless network.” *Id.*

obtain data connectivity – iPad customers can choose from multiple data plans whenever they like, and they can change or cancel their data plan whenever they like. Moreover, providers continue to rapidly expand the already seemingly endless variety of applications across many handset platforms that hundreds of thousands of applications.

B. Customer Conduct Confirms That the Wireless Marketplace Is Highly Competitive.

Finally, consumer conduct further confirms that the wireless marketplace is effectively competitive. In the *Fourteenth Report*, the Commission considered two categories of data – consumer “switching costs” and churn¹⁶³ – and both sets of data demonstrate that consumers routinely vote with their feet and have the ability to choose the wireless option that best fits their needs.

As the Report documents, consumers have many sources of information about wireless services both from the providers themselves and from numerous third parties.¹⁶⁴ Many providers including AT&T also offer trial periods that permit customers to terminate a new wireless agreement within a certain number of days (AT&T’s policy is 30 days) without an ETF.¹⁶⁵ And, as explained above, consumer satisfaction is very high.¹⁶⁶

Churn rates also remained steady, with overall monthly churn rates in early 2009 increasing slightly to 2.1 percent.¹⁶⁷ These data dramatically confirm, again, that consumers frequently switch providers; indeed, as the Report explains, approximately one quarter of customers switch their service providers every year, and the average “subscriber lifetime” with

¹⁶³ *Fourteenth Report* ¶¶ 229-230.

¹⁶⁴ *Id.* ¶ 231.

¹⁶⁵ *Id.* ¶ 232.

¹⁶⁶ *Id.* ¶ 233.

¹⁶⁷ *Id.* ¶ 245 & Chart 38; Executive Summary, at 9.

any given provider is only about four years.¹⁶⁸ A 25 percent turnover every year is an obvious real-world demonstration that “switching costs” are minimal, although the Report states merely that these data “provide some indication that some customers are not locked in.”¹⁶⁹

The Executive Summary (but not the Report itself) emphasizes that “[c]hurn rates of the two largest national service providers are half the rates for the next two largest providers,”¹⁷⁰ but this is no cause for concern. The Report shows T-Mobile’s churn to be above 3% for the second quarter of 2009, but more recent data shows that T-Mobile had reduced churn to 2.2% as of the first quarter of 2010, a decrease of nearly 33 percent.¹⁷¹ The report also shows Sprint’s churn to be about 3% for the second quarter of 2009, but Sprint just reported a churn rate of 1.85% for the second quarter of 2010, also a nearly 33 percent improvement.¹⁷² Moreover, churn is a function of many factors and will naturally vary from company to company. AT&T and Verizon have for many years been investing billions of dollars in their networks, devices, applications stores, customer care procedures and advertising to maximize customer satisfaction and to reduce churn, and those investments clearly have paid off.¹⁷³ Moreover, different providers have different

¹⁶⁸ *Id.* ¶ 247-48.

¹⁶⁹ *Id.* ¶¶ 244-48.

¹⁷⁰ Executive Summary, at 9.

¹⁷¹ T-Mobile Release, *T-Mobile USA Reports First Quarter 2010 Results*, available at [http://www.t-mobile.com/Cms/Files/Published/0000BDF20016F5DD010312E2BDE4AE9B/5657114502E70FF301288DC2EF2B5271/file/TMUS2010PressRelease-FINALV1\[1\].pdf](http://www.t-mobile.com/Cms/Files/Published/0000BDF20016F5DD010312E2BDE4AE9B/5657114502E70FF301288DC2EF2B5271/file/TMUS2010PressRelease-FINALV1[1].pdf).

¹⁷² Sprint Press Release, *Sprint Nextel Reports Second Quarter 2010 Results* (July 28, 2010), available at <http://investors.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle&ID=1452819&highlight=>.

¹⁷³ *Cf.* Sprint Investment Analysis, [http://www.wikininvest.com/stock/Sprint_Nextel_\(S\)](http://www.wikininvest.com/stock/Sprint_Nextel_(S)) (“In the past couple of years, Sprint’s most pressing problem has been a high churn rate for post-paid subscribers. . . . This has stemmed from Sprint’s difficulties integrating its iDEN and CDMA networks, which disrupted Sprint’s once stellar customer service, as well as unlimited calling plans by competitors, which have rendered the iDEN network’s minute-saving ‘push-to-talk’

mixes of postpaid and prepaid customers, and as the Report itself explains (§ 246), providers will inevitably experience greater churn with prepaid customers than with postpaid customers.

The *Fourteenth Report* devotes most of its analysis to early termination fees (“ETFs”) as a possible “switching cost” (§§ 234-38), but the Report’s discussion of these fees fails to place them in their proper context. AT&T (and other providers) offer customers a variety of ways to buy devices and services. AT&T customers can pay full price for a device – either from AT&T or from a third party – and obtain month-to-month service from AT&T with no ETFs, or they can purchase a subsidized device from AT&T in return for making a term commitment subject to a prorated ETF. AT&T also offers prepaid service with “Pay as You Go” that requires no credit check, no contract and no ETF. With the “bring your own phone” option, a customer with a compatible device also can sign up for month to month postpaid service with no contract, no ETF and no device purchase.

AT&T customers clearly understand that they have choices – indeed, AT&T has millions of month to month and prepaid subscribers. To be sure, most AT&T customers choose the subsidized (with ETF) option, because it is an extremely good deal. It allows the customer to obtain an expensive cutting edge device at a very low up-front cost, in exchange for a one or two year contract with a pro-rated ETF (which is sometimes less than the subsidy given by AT&T).¹⁷⁴ As such this purchasing option has undoubtedly played a key role in the dramatic

capability obsolete. In the first half of FY2009, Sprint lost roughly 1.15M iDEN post-paid customers.”); Matt Ablott, *How do you solve a problem like T-Mobile USA?*, Mobile Business Briefing (May 26, 2010), available at <http://www.mobilebusinessbriefing.com/article/how-do-you-solve-a-problem-like-t-mobile-usa-> (“T-Mobile USA has long been playing catch-up on this front. It didn’t even begin rolling-out 3G until 2008, by which point its main rivals had already outlined their plans to move to so-called 4G technologies: LTE in the case of Verizon and AT&T, WiMAX at Sprint.”).

¹⁷⁴ See also *Fourteenth Report* § 236 (noting that providers had explained that “ETFs allow them to subsidize handset purchases – including purchases of smartphones – for customers; and that

expansion of wireless services in the United States with more than 270 million subscribers.

AT&T has previously explained the many benefits to both consumers and providers of giving consumers the option of purchasing handsets at discounted prices in return for a term commitment with an ETF: “First, for many consumers, the high retail cost of wireless equipment would make wireless service unaffordable. Second, wireless providers value the predictability of term commitments. This predictability helps providers plan and manage networks. Term commitments also provide a predictable revenue stream that helps fund capital investment. In the aggregate, term commitments also allow providers to reduce the price of service to all subscribers because they reduce providers’ acquisition and retention costs and increase the number of users on the network, allowing providers to reduce operating costs through economies of scale. ETFs make this bargain – bundled discounts in exchange for term commitments – more efficient by giving consumers an option to reduce their contractual obligations while providing providers with enough predictability to make it reasonable to discount device prices in exchange for a service commitment.”¹⁷⁵

Finally, the Commission notes (§ 233) that it is considering new regulations that would require providers to provide certain kinds of information or usage alerts, and the press releases accompanying the Report pointedly note that the Commission is considering regulations to combat “bill shock.” As AT&T has explained in that docket, AT&T already provides consumers numerous ways to track and monitor their usage, including courtesy alerts when a customer

wireless providers normally recover those subsidies over the life of a contract, but cannot do so when a customer ends a contract early.”).

¹⁷⁵ Letter from Robert W. Quinn (AT&T) to Joel Gurin and Ruth Milkman (FCC), *Re: AT&T’s Early Contract Termination Policy*, CG Docket No. 09-158, at 10 (Feb. 23, 2010).

reaches 65% and 90% of their data plan's limit.¹⁷⁶ Although the European Union adopted certain "bill shock" rules in 2009, those regulations govern only intra-EU roaming charges, which can be high; mandating similar types of measures in this country will only stifle innovative pricing and terms.¹⁷⁷

¹⁷⁶ Comments of AT&T Inc., *Measures Designed to Assist US Wireless Consumers to Avoid Bill Shock*, CG Docket No. 09-158, at 2 (July 6, 2010).

¹⁷⁷ *Id.* at 2 & n.4.

CONCLUSION

For the foregoing reasons, the Commission should find in the Fifteenth Report that wireless markets are intensely competitive.

Respectfully Submitted,

/s/ Michael P. Goggin

David L. Lawson
James P. Young
Christopher T. Shenk
SIDLEY AUSTIN LLP
1501 K Street, N.W.
Washington, D.C. 20005
202-736-8088

Michael P. Goggin
Gary L. Phillips
Paul K. Mancini
AT&T Inc.
1120 20th Street, N.W.
Washington, D.C. 20036
202-457-2055

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MOBILE MISPERCEPTIONS

*Oren Bar-Gill and Rebecca Stone**

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I. INTRODUCTION

The cellular service market is an economically significant market that has substantially increased consumer welfare. From 1990 to 2008, the U.S. market grew from 5 million subscribers to 263 million subscribers. Eighty-six percent of Americans have a cell phone, and an increasing number of households rely entirely on wireless communications, giving up landlines altogether. Annual revenues of the four national carriers — AT&T, Verizon, Sprint, and T-Mobile — total over \$150 billion. Our focus, however, is on the failures of this market. We argue that the carriers design their contracts in response to systemic mistakes and misperceptions of their customers. In doing so they impose welfare costs on consumers, reducing the net benefit that consumers derive from wireless service. We focus on three design features common to most cellular service contracts: three-part tariffs, lock-in clauses, and sheer complexity.

A. Three Design Features

The basic pricing scheme of the common cellular service contract is a three-part tariff comprising: (1) a monthly charge; (2) an allocation of voice minutes that the monthly charge pays for; and (3) a per-minute price for minutes beyond the plan limit. We argue that the three-part tariff is a rational response by sophisticated carriers to consumers' misperceptions about their cell phone usage. Consumers choose calling plans based on a forecast of future use patterns. The problem is that many consumers do not have a very good sense of these use patterns. The three-part tariff is advantageous to carriers because it exacerbates the effects of consumer misperceptions, leading consumers to underestimate the cost of cellular service.

Specifically, some consumers underestimate whereas others overestimate their future usage. Crucially, consumers are not aware that their estimates are incorrect, which enables firms to exploit their misperceptions. The overage fee component of the three-part tariff targets the underestimators. These consumers underestimate the probability of exceeding the plan limit and incurring an overage fee, and as a result will underestimate the cost of cellular service. The other components of the three-part tariff — the monthly charge and the fixed number of minutes that come with it — target the overestimators. These consumers think that they will use all, or most, of their allotted minutes and so expect to pay a per-minute price equal to the monthly charge divided by the number of allotted minutes. In fact, the overestimators end up using far fewer minutes and paying a much higher

per-minute price than they anticipate. Thus, overestimators also underestimate the cost of cellular service.

Carriers seem to be aware of consumer misperceptions. As a top U.S. cellular phone carrier pricing manager has explained, “people absolutely think they know how much they will use and it’s pretty surprising how wrong they are.”¹ We empirically confirm the prevalence of consumer misperceptions using a unique dataset of subscriber-level monthly billing and usage information for 3,730 subscribers at a single wireless provider. These data allow us to calculate not only the total cost of wireless service under each consumer’s chosen plan, but also the total amount that the consumer would have paid had he chosen other available plans. Thus, we can determine the plan that best fits his actual cell phone usage. We show that over 65% of consumers chose the wrong plan. Some chose plans with an insufficient number of allotted minutes, whereas others chose plans with an excessive number of allotted minutes. Subscribers exceeded their minute allowance 17% of the time, by an average of 33%, suggesting underestimation of use. And, during the 81% of the time when the allowance was not exceeded, subscribers used only 47% of their minute allowance on average, suggesting overestimation.²

In addition to the three-part tariff pricing structure, most calling plans come with a free or substantially discounted phone and lock the consumer in for a substantial time period — typically two years — with long-term contracts and early termination fees (“ETFs”). Lock-in clauses and the accompanying ETFs can also be explained as a market response to the imperfect rationality of consumers. Consumers underestimate the cost of lock-in if they underestimate the likelihood that switching providers will be beneficial down the road. Switching providers may be beneficial if service is not as good as promised, monthly charges are higher than expected (due to the misperception of use levels discussed above), or another carrier is offering a better deal. The lock-in that is enforced by the ETF also facilitates the common bundling of phones and service. The long-term revenue stream that lock-in guarantees enables carriers to offer free or subsidized phones. Rational consumers would not be enticed by a free phone, realizing that they will pay for this “free” phone in the long-term. Imperfectly rational consumers, by contrast, discount the long-term cost and seek out “free” phone offers.

Finally, cellular service contracts are complex and multidimensional, and choosing among numerous contracts can be a daunting task. The three-part tariff itself is complex. Lock-in clauses and ETFs add further complexity. And the true cost of a calling plan depends on

1. Michael Grubb, *Selling to Overconfident Consumers 1 & n.2* (Mar. 26, 2008) (unpublished manuscript, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=721701).

2. The remaining 2% use up their allowances exactly.

numerous other features. For example, most plans offer unlimited night and weekend calling, but carriers offer different definitions of "night" and "weekend." Also, consumers must choose between unlimited in-network calling, unlimited calling to five numbers, unlimited Walkie-Talkie, roll-over minutes, and more. Finally, different carriers offer different ranges of handsets, handset subsidies vary, and so on. Complexity is further increased when family plans are added to the mix, when data services are added to voice services, when pre-paid plans are considered in addition to post-paid plans, etc. According to one industry estimate, the cellular service market boasts millions of plan and add-on combinations.

This level of complexity can itself be viewed as a contractual design feature that responds to the imperfect rationality of consumers. Complexity allows providers to hide the true cost of their contracts. Imperfectly rational consumers do not effectively aggregate the costs and prices of the many components of available plans. Inevitably, consumers will focus on a subset of salient features and prices, and ignore (or underestimate the importance of) the remaining non-salient dimensions. In response, providers will increase non-salient prices or reduce the quality of the non-salient features, which, in turn, will generate or free-up resources for intensified competition on the salient dimensions. Competition forces providers to make the salient features attractive and the salient prices low. This can be achieved by adding revenue-generating non-salient features and prices. The result is an endogenously derived high level of complexity and multidimensionality. Interestingly, consumer learning can exacerbate the problem. When consumers learn the importance of a previously non-salient feature, carriers have a strong incentive to come up with a new one, further increasing the level of complexity.

B. Rational Choice Explanations?

Before we can draw normative and prescriptive implications from these behavioral theories, we must consider whether the more traditional rational choice model can explain the same design features. If the rational choice model comes up short, then we have good reason to appeal to behavioral economics to assess the appropriate policy response. The leading rational choice explanation for three-part tariffs views them as mechanisms for price discrimination or market screening between rational consumers with different ex ante demand characteristics. We show that the price discrimination argument rests on specific assumptions about the distribution of consumer types — assumptions that are not satisfied in the cell phone market. With the distribution of types that we actually observe, providers facing rational consumers will not offer three-part tariffs.

Lock-in clauses can arise when consumers are rational. This occurs when sellers incur substantial per-consumer fixed costs and liquidity-constrained consumers cannot afford to pay upfront fees equal to these fixed costs. In the cell phone market, fixed costs are indeed high with carriers investing up to \$400 in acquiring each new customer. However, these costs are also in large part an endogenous consequence of carriers' decisions to offer free or subsidized phones. This raises a series of questions. Why do carriers offer free phones and lock-in contracts? Why not charge customers the full price of the phone and avoid lock-in? How many consumers cannot afford to pay for a phone up front? For how many of these liquidity-constrained consumers is the carrier the most efficient source of credit? The rational choice model can explain the presence of lock-in clauses, but only in a subset of contracts.

The rational choice explanation for complexity is straightforward. Consumers have heterogeneous preferences, and the complexity and multidimensionality of the cellular service offerings cater to these heterogeneous preferences. It is likely that this heterogeneity explains some of the observed complexity in the cell phone market. But, it is unlikely that it can fully account for the staggering level of complexity exhibited by the long menus of multi-dimensional contracts that are available to consumers. Even for the rational consumer, acquiring information on the range of complex products and comparing different plans with many different features are time-consuming and costly activities. Beyond some level of complexity, the costs exceed the benefit of finding the perfect plan. Comparison shopping is deterred, and the benefits of the variety and multidimensionality are left unrealized. It seems that in the cell phone market the optimal level of complexity has been exceeded.

C. Welfare Costs

The design of cellular service contracts is best explained as a rational response to the imperfect rationality of consumers. Mistakes that consumers make and providers' responses to these mistakes hurt consumers and generate consumer welfare costs. First, overconfident consumers choose the wrong three-part tariff, that is, they do not choose the plan that would minimize their total costs. We estimate the total annual reduction in consumer surplus from the three-part tariff structure to be \$11.92 billion. Moreover, while the average harm per consumer, \$47.68, is small, this average masks potentially important distributional implications. The \$11.92 billion harm is not evenly divided among the 250 million U.S. cell phone owners. Many of these subscribers choose the right plan. Even among those who choose the wrong plan, there is substantial heterogeneity in the magnitude of