The IP/Broadband Transition – Public Policy Still Matters

A Response to Anna-Maria Kovacs' "Telecommunications competition: the infrastructure-investment race"

Prepared for NASUCA by

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Investment Race or Race to the Bottom?—Key Policy Issues with the IP-Broadband Transition

A Response to Anna-Maria Kovacs' "Telecommunications competition: the infrastructure-investment race"

Trevor R. Roycroft, Ph.D.[1]

Executive Summary:

Anna-Maria Kovacs' recent white paper, prepared on behalf of the Internet Innovation Alliance, argues (1) that incumbent local exchange carriers (ILECs) are not investing in broadband because of alleged regulatory obligations that require wasteful investment in "duplicate" copper-based circuit-switched networks; (2) that the small volume of voice traffic, compared to all Internet protocol (IP) traffic, negates the importance of policy oversight of the IP transition; and (3) that competition has given consumers "a plethora of choices," over "various platforms," which further undermines the need for regulatory oversight. Dr. Kovacs' arguments do not stand up to scrutiny:

- Dr. Kovacs bases her arguments regarding ILEC investment on the 2011 Atkinson study. However, the conclusions of the Atkinson study are misinterpreted by Dr. Kovacs—the Atkinson study shows that ILEC IP-broadband transition is underway, with ILECs targeting about two-thirds of investment at next generation technologies, not the "47%" broadband investment identified by Dr. Kovacs. Furthermore, Dr. Kovacs ignores the fact that substantial portions of ILEC "legacy" facilities and investments are shared by ILEC broadband facilities.
- Dr. Kovacs asserts that ILECs that upgrade their networks to support broadband are required to operate duplicate networks—one based on legacy technologies that are inefficient, another based on IP-broadband. This is incorrect, there is clear evidence from ILECs that they operate a single network during the IP-broadband transition.
- Dr. Kovacs also asserts that ILECs, where they have deployed fiber, are required by regulation to maintain copper facilities. This claim is also incorrect. The FCC long ago freed ILECs from the need to maintain copper facilities where they have deployed fiber.
- While Dr. Kovacs claims that elimination of carrier of last resort obligations will result in fiber-based broadband build-outs, she overlooks statements and actions taken by large ILECs with wireless affiliates (like Verizon and AT&T) that indicate that they want to replace all wireline facilities (including wireline broadband) with wireless in some areas.
- Dr. Kovacs argues that because there are so many non-voice bits circulating on IP networks (mostly streaming video), the relevance of voice is diminished. This is an unreasonable perspective. The flood of IP-based video traffic does not diminish the importance of high quality voice services, nor does it diminish the complex issues that will arise as voice services are transitioned to an all-IP platform.

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- With regard to issues of network reliability and access to emergency services, Dr. Kovacs asserts that consumers are capable of solving addressing these issues on their own through their purchase of "multiple infrastructures." This is not a reasonable conclusion. Not all consumers can afford multiple infrastructures, and as was made clear from the experience of Superstorm Sandy, wireless and next generation IP-based technologies are not immune from simultaneous failure—multiple systems can easily fail, especially if they are not adequately backed-up in the first place.
- Dr. Kovacs' perspective on competition, while focusing on consumers' ability to choose from many alternatives that ride over-the-top of a broadband connection, ignores the dearth of competition in the underlying broadband market. There is substantial evidence that wireline broadband markets are not competitive and are instead characterized by duopoly conditions. In addition, Dr. Kovacs' claims regarding consumers' willingness and ability to substitute wireless broadband options for wireline broadband services are not reasonable. Wireless broadband is metered and much more costly than wireline alternatives.

There is no question that the transition to all-IP broadband networks is underway. However, this transition does not eliminate the underlying public policy objectives that regulators have promoted—affordable rates, high quality services, 911 access, or broadband deployment. It is reasonable to anticipate the ongoing need for policy oversight of the IP-broadband transition, and the need for a reasoned determination of when regulation may be needed to correct market failures, or enable rapid resolution of conflicts. Dr. Kovacs' conclusion that "liberating" ILECs from regulatory oversight will produce additional investment and result in the optimal outcome is not reasonably supported. Many of the policy objectives that have been fulfilled through the legacy Public Switched Telecommunications Network will continue to be valid in the IP-broadband world. The following areas continue to require the attention of policymakers, regardless of the technology that is utilized to provide critical telecommunications services:

- **Affordability:** Broadband and wireless services are increasingly viewed as necessities. Policy makers should consider whether steps are necessary to mitigate affordability concerns.
- **Limited Competition:** Duopoly wireline broadband markets, and consolidating wireless markets, should be monitored to determine whether markets are delivering economically efficient outcomes.
- **Reliability and Service Quality:** Legacy wireline voice networks have delivered reliable and high quality service, providing value to consumers and contributing to the fulfillment of critical public safety objectives. As broadband and wireless are now viewed as necessities, reliability and service quality standards for new technologies must be addressed.
- **Access to Emergency Services:** The transition to an alternative technology platform does not reduce the importance of robust access to emergency service providers. Policy makers should monitor the oversight of the transition to IP-based broadband, and ensure

that the benefits associated with high-quality systems continue. The issue of backup power also requires careful attention.

- **Carrier of Last Resort and Universal Service:** Carrier of last resort obligations, the requirement that local telephone companies make service available to all households in their service area, have ensured that affordable and reliable telephone service is available on reasonable request to all households. While voice services have been subject to COLR obligations, broadband services are not. Going forward, access to affordable, high-quality broadband services will be as important as access to legacy voice services has been. Determining how COLR costs will be recovered, and the criteria required to ensure broadband availability will be critical.
- **Informed Consumers and Consumer Education:** During the transition to IP-broadband, policy makers should ensure that educational efforts are ongoing, so as to inform consumers of changes and the potential impact of changes, and to promote an open dialog regarding consumer needs during the transition.

Table of Contents

Introduction

The overarching technology story in the coming decade will be the expansion and deeper integration of broadband into the lives of individuals, businesses, and government. Running in parallel to the expansion of broadband will be the transition of the PSTN. Given the billions of dollars that have been invested in the legacy PSTN, and the billions more that need to be invested to create a new public broadband network, the stakes are certainly high.

This is not the first market or technology transformation that the PSTN has experienced. Generations of circuit-switch technologies, from manual switchboards to electro-mechanical have come and gone. Similarly, signaling migrated from the common channel to Signaling System 7, ushering in the "intelligent" PSTN. Competition arising from facilities-based and non-facilities-based rivals to Incumbent Local Exchange Carriers (ILECs) emerged. With these previous technological and market transformations, key public policy objectives were pursued, including those associated with ensuring consumer protection and fair competition. The pressing question facing policy makers today is whether the transition to IP-broadband networks reduces the need for regulators to pursue important policy objectives associated with service affordability, service quality and network reliability, access to emergency services, universal service, and competition. As will be discussed in this report, policy objectives are not trumped by technological change. Areas of policy concern associated with consumer protection, universal service, and fair competition continue to be valid. Regulators and policy makers should ensure that the transition to IP-broadband networks does not become a race to the bottom with regard to these key policy areas.

Anna-Maria Kovacs' recent white paper, prepared on behalf of the Internet Innovation Alliance, argues that now is the time for regulators to get out of the way. Her solution to the challenges facing policy makers during this transition is to remove legacy regulations that govern ILECs, with the promised result being an increase in competition and investment. Dr. Kovacs' paper, however, adds little to the IP transition debate.[1] In a nutshell, Dr. Kovacs argues (1) that ILECs are not investing in broadband because of alleged regulatory obligations that require wasteful investment in "duplicate" copper-based circuit-switched networks; (2) that the small volume of voice traffic, compared to all Internet protocol (IP) traffic, negates the importance of policy oversight of the IP transition; and (3) that competition has given consumers "a plethora of choices," over "various platforms," which further undermines the need for regulatory oversight. As will be discussed below, Dr. Kovacs' arguments do not stand up to scrutiny as she overlooks important issues that require the close attention of policy makers during the ongoing transition from legacy time division multiplexing (TDM) networks to IP-broadband networks.

Is Regulation Derailing Broadband Investment?

The main conclusion offered by Dr. Kovacs relates to the alleged negative impact on broadband deployment of public interest regulatory obligations imposed on telephone companies.

[1] Dr. Kovacs' position is similar to one recently advanced by AT&T before the Federal Communications Commission. See, AT&T's November 7, 2012 ex parte, docketed by the FCC *In Re AT&T Petition to Launch a Proceeding Concerning the TDM-to-IP Transition; Petition of the National Telecommunications Cooperative Association for a Rulemaking to Promote and Sustain the Ongoing TDM-to-IP Evolution*, WC Docket No. 12-353.

According to Dr. Kovacs the culprits are those obligations associated with service quality, carrier of last resort (COLR), and universal service. Specifically, Dr. Kovacs claims:

> The combination of such service-discontinuation and service-quality regulations with COLR obligations has forced the ILECs to continue to spend capital and operating funds on the obsolete copper-based, circuit-switched legacy network that most consumers no longer desire. That leaves less capital available for the fiber-based IP network consumers do need and want.[2]

In Dr. Kovacs view, once these obligations are eliminated, the floodgates of fiber-based investment will be opened. There is, however, little evidence that investment by ILECs, in fiber or otherwise, is being inhibited by regulation.

Dr. Kovacs is wrong about ILEC broadband investment

According to Dr. Kovacs, "Given that half the capital spent in the 2006 through 2012 period was spent on legacy plant—and that far more than half the capex [capital expenditures] in the earlier period was spent on legacy plant—it is fair to assume that more than half the infrastructure in place today is legacy and less than optimally efficient."[3] Dr. Kovacs' claim is incorrect. Her arguments regarding capital expenditures are based on the Atkinson study published by CITI.[4] As will be discussed below, Dr. Kovacs' interpretation of the Atkinson study distorts that study's actual conclusions.

First of all, care must be exercised when interpreting ILEC investments as there is no question that ILECs are currently utilizing substantial proportions of their legacy infrastructure to deliver broadband services. Dr. Kovacs admits as much in her report, as she describes AT&T's U-verse service in detail.[5] Carriers like AT&T have upgraded their legacy networks to deliver advanced DSL, and in AT&T's case, an IP-broadband platform utilizing VDSL. But Dr. Kovacs ignores the investment implications of legacy investment supporting broadband services.

To understand the interrelated nature of legacy and next generation investment, AT&T's U-verse provides a fine case study, but apparently the lessons are lost to Dr. Kovacs. U-verse is copper-based digital subscriber line (DSL) technology. While AT&T has pushed fiber cable deeper into the neighborhoods it serves with the VDSL platform, U-verse customers are served using the same copper wires that at one time provided only legacy voice services. Furthermore, to get more speed out of its legacy network, AT&T has engaged in "pair bonding" to boost broadband speeds.[6] When using pair bonding, a DSL provider relies on multiple **copper** pairs to deliver

[2] Kovacs, p. 13.

[3] Kovacs, p. 21.

[4] Robert C. Atkinson, Ivy E. Schultz Travis Korte, and Timothy Krompinger. "Broadband in America 2nd Edition: Where It Is and Where It Is Going (According to Broadband Service Providers). An Update of the 2009 Report Originally Prepared for the Staff of the FCC's Omnibus Broadband Initiative." Columbia Institute for Tele-Information May, 2011. http://www4.gsb.columbia.edu/filemgr?file_id=738763.

[5] Kovacs, p. 20.

[6] http://escrbconsortium.org/att-boosts-uverse-speeds-for-some-californians/.

enhanced data rates. These copper pairs are legacy plant, the very type of legacy plant that Dr. Kovacs claims carriers are unnecessarily being required to maintain for legacy services.

Splitting ILEC investment between broadband and legacy services is not as clear cut as Dr. Kovacs suggests. Investment dollars that support portions of legacy plant (e.g., poles, conduit, fiber feeder, copper distribution) also support broadband. Thus the answer to questions regarding which investments are used to support legacy services depends on cost allocations, which may be arbitrary. This fact is recognized in the 2011 Atkinson study cited by Dr. Kovacs. The Atkinson study states:

> How much of this total capital investment goes towards broadband? Since much of the capex is for general-purpose digital networks that can carry voice, data and video, the answer is largely based on allocating the capital among a variety of services. One 2009 estimate was that:
>
> > "Approximately two-thirds of AT&T's 2009 investment will extend and enhance the company's wireless and wired broadband networks to provide more coverage, speed and capacity."
>
> It is clear that the major telephone companies have shifted wireline capital from their "legacy" telephone networks to wired broadband, with broadband capex expected to reach nearly 60% of total wireline capex in 2011.[7]

It is important to note that the estimate of AT&T's investment allocation in the passage from the Atkinson study above **comes directly from AT&T**.[8] AT&T's reported split between legacy and non-legacy operations in 2009 was approximately two-thirds non-legacy. Also noted in the Atkinson report, the two-thirds non-legacy figure also reflected industry conditions, not just AT&T's capital expenditures:

> AT&T's estimate of two-thirds is consistent with the observation of a market research firm that "broadband remains the primary capex driver" for 2008-09 because,"Wireline and wireless carriers alike are stepping up their network investments to make high speed Internet connections, and associated triple-play bundles, available to a greater portion of their customers." The firm added that, "…there has been a pronounced shift in capex towards new, broadband platforms, and away from narrowband systems." Skyline Marketing Group, CapEx Report–2008 Annual Report at 1.[9]

Dr. Kovacs completely ignores this information from the Atkinson report, which reflects industry trends prior to, for example, AT&T and other ILECs' more recent announcements regarding additional broadband investment (discussed below). Thus, the shift to broadband investment was documented in the Atkinson report, with the share associated with legacy networks showing a substantial decline. However, Dr. Kovacs completely ignores that information, and further distorts the Atkinson studies' stated conclusion.

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[7] Robert C. Atkinson, Ivy E. Schultz Travis Korte, and Timothy Krompinger. "Broadband in America 2nd Edition: Where It Is and Where It Is Going (According to Broadband Service Providers). An Update of the 2009 Report Originally Prepared for the Staff of the FCC's Omnibus Broadband Initiative." Columbia Institute for Tele-Information May, 2011, p. 42. http://www4.gsb.columbia.edu/filemgr?file_id=738763 .

[8] http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=26597 .

[9] Atkinson Report at p. 42.

When citing to the Atkinson study, Dr. Kovacs repeatedly refers to evidence from the 2006-2011 period,[10] which she says shows the majority of ILEC investment going to legacy services, and only "47% broadband."[11] This is a misuse of statistics. The most important statistic when considering broadband investment is what carriers are doing in the **most recent period and going forward**, not what they have done in the distant past.[12] By focusing on the historical average, Dr. Kovacs presents a false impression of the trend. Today, it is not "half"[13] of investment that is being targeted at legacy and "half" targeted at broadband. Rather, evidence indicates that a much larger percentage of ILEC investment is directed at non-legacy technologies, with AT&T and Atkinson identifying its 2009 portion as "approximately two-thirds." [14]

Furthermore, as also noted by the Atkinson report, much of the balance of investments that are allocated to legacy technologies also indirectly support broadband. There is ample evidence that ILECs are investing, and that regulation is not standing in the way of these investments. Even Dr. Kovacs acknowledges the favorable investment activities of the nation's largest ILEC, AT&T:

> In response to the success of U-verse, AT&T has increased its investment, announcing that it would spend an additional $6 billion to bring U-Verse to 8.5 million more customer locations over three years. In total, its goal is to cover 57 million customer locations with U-verse and U-verse IPDSLAM by the end of 2015. AT&T is also investing to increase U-verse transmission speed, to 45 Mbps initially, with a goal of 100 Mbps. AT&T also announced that it would take fiber to an incremental 1 million business locations.[15]

Apparently, regulation has not inhibited AT&T from making these investments. AT&T's U-Verse experience is also illustrative of the fact that ILECs are not maintaining "two parallel networks," the next of Dr. Kovacs' claims to be examined.

Dr. Kovacs' assertion that telephone companies are required to "maintain two networks" is incorrect

Dr. Kovacs asserts that ILECs that upgrade their networks to support broadband are required to operate duplicate networks—one based on legacy technologies that are inefficient, another based

[10] Kovacs, pp. 1, 20, & 24.

[11] Kovacs, p. 20.

[12] This is exactly the approach utilized in the Atkinson study. While reporting historical data, the Atkinson study focuses on the most recent data: "It is clear that the major telephone companies have shifted wireline capital from their "legacy" telephone networks to wired broadband, with broadband capex expected to reach nearly 60% of total wireline capex in 2011." (Atkinson study, p. 42.) The "going forward" view may also rely on statements made by ILECs regarding future plans, such as those made by AT&T associated with its "Project Velocity IP." See, for example, "AT&T's $14B Project VIP: breaking out the business service, U-verse numbers," *Fierce Telecom*, September 24, 2013. http://www.fiercetelecom.com/special-reports/atts-14b-project-vip-breaking-out-business-service-u-verse-numbers

[13] Kovacs, p. 21.

[14] AT&T, "AT&T to Invest More Than $17 Billion in 2009 to Drive Economic Growth," AT&T Inc., 2009, http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=26597.

[15] Kovacs, p. 20, citing AT&T Analyst Conference 2012, November 7, 2012, slide presentation, slide 112.

on IP-broadband, and that this requirement results in subpar broadband investment.[16] Dr. Kovacs also asserts that ILECs, where they have deployed fiber, are required by regulation to maintain copper facilities.[17] These claims are incorrect. **In the FCC's 2003 *Triennial Review Order*, the FCC allowed ILECs that overbuild fiber-to-the-home networks to retire copper, subject to disclosure, i.e., they must inform existing wholesale customers of the copper retirement.**[18] The risk that is introduced as a result of the FCC's copper retirement policy is to competitors who utilize copper-based unbundled network facilities (including the use of unbundled copper loops for broadband). The bottom line is that FCC rules already protect ILECs from having to maintain two networks.

Other telephone companies have recently informed the FCC that claims regarding the existence of "parallel networks," one legacy, another IP-broadband, are unreasonable. A group representing small telephone companies responded to claims made by AT&T:

> AT&T's claim that it is necessary for carriers to run two parallel networks operating at the same time during the conversion from TDM-to-IP evolves as further network investment and deployments take place **is inconsistent with the operational experience of NRIC's member companies**. . . . In NRIC's member companies' experience, the evolution from TDM-to-IP allows carriers to retire one type of investment with a new, more efficient type of investment in an incremental rather than wholesale manner. This evolution occurs as a business case is developed for deployment, as depreciated or obsolete equipment is replaced, and as funding is available for investment in these technologies.[19]

NRIC's comments provide additional evidence that the transition to IP-broadband networks does not result in parallel networks.

In summary on this point, there is no evidence that ILECs are required to, or do, maintain two "parallel networks" as they transition from TDM to IP-broadband.

Dr. Kovacs is wrong about regulatory obligations and ILEC fiber builds

On the matter of parallel networks, Dr. Kovacs also points favorably to Google's experience in its Kansas City fiber build:

> Unlike the ILECs, Google is building a single network—it does not have to provide a duplicate copper-circuit-switched network. . . .
>
> Unlike the ILECs, Google can pick its "fiberhoods." It can choose the neighborhoods whose cost characteristics are inherently most appealing (overhead rather than

[16] Kovacs, p. 21.

[17] "Unlike the ILECs, Google is building a single network—it does not have to provide a duplicate copper-circuit-switched network." Kovacs, p. 23.

[18] Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Report and Order and Order on Remand and Further Notice of Proposed Rulemaking, CC Docket No. 01-338, ¶271, August 21, 2003.

[19] Nebraska Rural Independent Companies (NRIC) January 28, 2013 Comments in FCC Docket WC Docket No. 12-353, p. 16, emphasis added.

> underground wiring, for example) and where it has predetermined that there is adequate demand.[20]

While it is clear that there is no requirement for "duplicate copper-circuit-switched" networks, on the matter of ILECs' alleged inability to pick "fiberhoods," here again Dr. Kovacs is just plain wrong. Those ILECs, like Verizon, that have deployed fiber-to-the-home have not been operating under the compulsion of fiber COLR obligations. Verizon has "picked its fiberhoods" where it finds the most appeal, based on the cost characteristics and expected revenues.[21]

In conclusion, ILECs operate integrated networks that reflect their relative progress of making the transition to broadband. There is **no evidence** that ILECs are required to maintain copper networks where they deploy fiber. The evidence of a widespread and nationwide effort on the part of ILECs to transform their networks to advanced service platforms indicates that the investment incentives of ILECs are not being undermined by regulation—ILECs are investing in advanced technology in areas where they believe it will be profitable.[22]

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[20] Kovacs, p. 23.

[21] As of December 31, 2012, Verizon passed 17.6 million households with its fiber-based FiOS offering. (Verizon 10-K for the year ending December 31, 2012, p. 10.) According to Verizon documents, Verizon's legacy service areas associated with Bell Atlantic and NYNEX contained 22 million households. http://www.verizon.com/investor/corporatehistory.htm. Of course, Verizon unloaded some its legacy properties to FairPoint, and also retained some properties (such as those in Southern California), when it jettisoned the former GTE assets. So the exact count of households located in Verizon's current service area is not easy to determine. It is, however, no secret that large portions of Verizon's service area remain unserved by FiOS. For example, Boston has virtually no FiOS deployment. See, "Verizon riles Boston mayor with FiOS commercial as it hunts regulatory relief in Mass." *Fierce Telecom*, October 8, 2013, http://www.fiercetelecom.com/story/verizon-riles-boston-mayor-fios-commercial-it-hunts-regulatory-relief-mass/2013-10-08.

[22] As Verizon informed the FCC earlier this year:

> Verizon has invested heavily in transitioning from its decades-old copper-and-TDM-based networks to new fiber-based IP networks. Verizon has spent billions of dollars to deploy a fiber-to-the-premises network past nearly 18 million homes and businesses, offering voice, Internet, and video services. More than 14.5 million premises in Verizon's footprint are open for sale, and of those, more than 37 percent subscribe to FiOS Internet service.
>
> AT&T's Project Lightspeed was a multibillion-dollar initiative to deploy more than 40,000 miles of new, fiber-optic facilities to enable AT&T to provide VoIP and Internet access services, as well as U-verse video service. AT&T recently announced a $6 billion investment plan "to expand and upgrade its wireline network to bring robust IP broadband services" to more than 75 percent of its wireline footprint, "[a]s its traditional DSL broadband technology approaches the end of its life cycle." CenturyLink "continue[s] to invest in [its] fiber to the node . . . deployment," and expected its 2012 fiber investment, which included fiber-to-the-tower connections, to be approximately $2.8 billion to $2.9 billion. Frontier invested more than $2 billion in the last three years to "enhanc[e] the existing outside plant by pushing fiber deeper into the network, enhanc[e] interoffice transport and expand[] the capability of [its] data backbone." Windstream expected to incur capital expenditures between $950 million and $1.05 billion in 2012, more than the $702 million spent in 2011, "due to [its] significant investments in fiber-to-the-tower and other initiatives." FairPoint has exceeded the capital expenditure commitments totaling more than $260 million it was required to make in Maine and Vermont by March 31, 2011, and is on track to spend $350.4 million in New Hampshire by March 31, 2015.

Verizon and Verizon Wireless Comments, in WC Docket No. 12-353, January 28, 2013, pp. 5-6, and pp. 8-9.

Elimination of COLR and other regulatory obligations will not always result in fiber deployment—large ILECs want to jettison wireline broadband in some areas

Dr. Kovacs' main argument is that legacy regulatory obligations are preventing the ILECs from making investments in fiber. However, Dr. Kovacs overlooks evidence that indicates that lifting regulatory obligations on ILECs would result in the **elimination of wireline broadband options.** For example, Verizon recently made requests at both the New York Public Service Commission (NY PSC) and the Federal Communications Commission for permission to eliminate wireline service options (voice and DSL) in Fire Island, New York, and to replace that service with a fixed wireless alternative that runs over Verizon's wireless Long Term Evolution (LTE) network—"Voice Link."[23] As noted by the NY PSC:

> [T]he proposed (Voice Link) service will be materially different than the services previously offered by Verizon and experienced by its customers pursuant to the company's existing tariffs. For example, service over Voice Link will include unlimited calling (local, regional, toll, and long distance) and custom calling features that the customer may or may not have had prior to the damaged facilities. The customer must supply commercial power to the Voice Link device mounted inside the premises, resulting in no service if power is lost for a long period of time. Fax machines, medical alert and home security monitoring systems, as well as credit card machines are incompatible. **Digital Subscriber Line (DSL) services will not be available**. . . .[24]

The Voice Link experience is important to consider in light of claims made by Dr. Kovacs. Large ILECs with wireless affiliates (like Verizon and AT&T) may be more than happy to abandon wireline networks, including existing wireline broadband, and replace all wireline services with their more profitable (and metered) wireless offerings. Furthermore, the Fire Island experience shows that a wireless-only alternative is unacceptable for many households.

The Voice Link product is very similar to wireless mobility alternatives that Dr. Kovacs implies are pure substitutes for both wireline voice and broadband.[25] If that was the case, then consumers in Fire Island should have been indifferent to the prospect of having their wireline service replaced with Verizon's Voice Link. However, the public response to a mandate of "wireless only" services was so negative and pronounced that Verizon eventually backed off from the Voice Link-only proposal in New York.[26]

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[23] See, Application of Verizon New Jersey Inc. And Verizon New York Inc. to Discontinue Domestic Telecommunications Services, WC Docket No. 13-150, Comp. Pol. File No. 1115, filed June 7, 2013. See also, New York Public Service Commission Case 13-C-0197 – *Tariff filing by Verizon New York Inc. to introduce language under which Verizon could discontinue its current wireline service offerings in a specified area and instead offer a wireless service as its sole service offering in the area.*

[24] NY PSC Case 13-C-0197 - Tariff filing by Verizon New York Inc. to introduce use of wireless technology as an alternative to repairing damaged facilities. Order Conditionally Approving Tariff Amendments in Part, Revising in Part, and Directing Further Comments (Issued and Effective May 16, 2013), p. 6 (emphasis added). http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={C0F21317-B7CE-4AEE-9A38-3393D1DEB670}.

[25] Kovacs, pp. 11 and 41.

[26] "Verizon Backing Off Plans for Wireless Home Phones," *New York Times*, September 13, 2013. http://www.nytimes.com/2013/09/13/nyregion/verizon-abandons-plans-for-wireless-home-phones-in-parts-of-new-

Verizon's Fire Island request was ostensibly about its alleged inability to repair damage to facilities that were damaged by Superstorm Sandy. However, it is clear that Verizon's Fire Island efforts were also reflective of a broader vision on the part of Verizon to abandon all wireline service in portions of its service area. On June 21, 2012, **four months prior to Superstorm Sandy and the damage to Verizon's New York and New Jersey facilities**, Verizon's CEO Lowell McAdam described Verizon's vision with regard to its copper plant as follows:

> "[T]he vision that I have is we are going into the copper plant areas and every place we have FiOS, **we are going to kill the copper**. We are going to just take it out of service and we are going to move those services onto FiOS. We have got parallel networks in way too many places now, so that is a pot of gold in my view.
>
> **And then in other areas that are more rural and more sparsely populated, we have got LTE built that will handle all of those services and so we are going to cut the copper off there. We are going to do it over wireless.**"[27]

AT&T has made a similar announcement.[28] Thus, elimination of wireline, including broadband, is part of the business strategies of these companies. Lifting regulatory obligations will provide no assurance that large carriers like AT&T and Verizon will deploy fiber. Their public statements point to the alternative objective of eliminating wireline broadband.

Wall Street frowns on fiber, deterring ILEC fiber investments

Dr. Kovacs pins the blame for the restraint on fiber investment entirely on regulatory obligations:

> The combination of such service-discontinuation and service-quality regulations with COLR obligations has forced the ILECs to continue to spend capital and operating funds on the obsolete copper-based, circuit-switched legacy network that most consumers no longer desire. That leaves less capital available for the fiber-based IP network consumers do need and want.[29]

However, short-term concerns regarding stock market performance and the reaction of Wall Street have contributed to fiber-investment deterrents facing ILECs, and Dr. Kovacs overlooks public statements made by Verizon regarding its experience with fiber deployment. When Verizon pursued its fiber deployment plant, **Wall Street** punished Verizon shareholders:

> Verizon spokesman Edward McFadden said the decision to build the FiOS network was not popular on Wall Street. "We got hammered," he said, "and our shareholders were punished for this."[30]

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york.html . Verizon has not retracted the Voice Link plan in New Jersey, potentially eliminating wireline broadband in those storm-affected areas.

[27] Verizon CEO Lowell McAdam at Guggenheim Securities Symposium, June 21, 2012 (emphasis added). Available at: www.media-alliance.org/downloads/Verizon_Kill_Copper.pdf.

[28] The implication being that for as much as 25% of AT&T's service area, consumers may face a wireless-only option. See, http://www.att.com/gen/press-room?pid=23506&cdvn=news&newsarticleid=35661.

[29] Kovacs, p. 13.

[30] "Hoping for FiOS, some cities now feel abandoned by Verizon," *Philadelphia Inquirer*, April 29, 2012. http://articles.philly.com/2012-04-29/business/31475013_1_fios-verizon-wireless-wireless-spectrum . See also "Net

In contrast, AT&T's copper-based U-Verse deployment avoided the short-term downside that would have "punished" its shareholders. Focus on short-term financial results, not regulatory barriers, provides an alternative and compelling explanation for some ILECs' failure to pursue fiber.

Dr. Kovacs incorrectly blames regulation for ILECs' technology transformation challenges

ILECs certainly face investment challenges associated with the IP-broadband transformation. However, those challenges are not the fault of regulation. Dr. Kovacs indicates that regulators are somehow standing in the way:

> To enhance competition and achieve the world-leading role in broadband-access that Congress and the Administration desire, the U.S. IP transition must be completed and the ILECs must be allowed to repurpose the capital that is currently deployed to support their obsolete circuit switched networks into fiber-based broadband IP networks.[31]

There is no question that capital should be repurposed, but as discussed above, this is already happening on a wide scale. However, the pace of change should not be blamed on regulators. This latest technology transformation is substantial, and as a result the challenges facing ILECs are also substantial. Consider the perspective of CenturyLink,[32] a large ILEC, which earlier this year informed the FCC:

> The TDM-to-IP transition has begun. Last year, CenturyLink invested nearly $3 billion in its network, including expenditures to enhance its broadband reach and expand fiber-based backhaul to mobile wireless cell sites. CenturyLink ended the third quarter of 2012 with more than 5.8 million broadband customers. In just that quarter, CenturyLink added nearly 155,000 broadband subscribers, enabled over 310,000 living units with fiber-to-the-node service (for a total of 6.8 million), completed construction of fiber backhaul facilities to nearly 1,400 wireless cell sites (for a total of 13,500), and expanded its Ethernet-over-copper footprint. Network migration to an IP platform continued in real time for many providers. . . . CenturyLink … continues to plan the migration of its TDM-based network equipment and facilities to IP in 37 states.
>
> Nevertheless as an industry, **we are still in the early stages of the TDM-to-IP transition.** ILECs face the costly and daunting task of migrating TDM networks and systems that were developed over decades. **In the case of CenturyLink, its existing local networks currently include approximately 3,800 circuit switches. Complete migration to IP will require the company to replace these switches with packet-**

Neutrality - Beware the Law of Unintended Consequences," Bernstein Research, April 7, 2006 http://www.nextgenweb.org/wp-content/uploads/2007/08/net-neutrality-beware-the-law-of-unintended-consequences.pdf .

[31] Kovacs, p. 2.

[32] CenturyLink combined the smaller ILEC CenturyTel with the operations of the former RBOC USWest. CenturyTel had service areas in smaller markets around the nation. USWest served the Pacific Northwest and upper Midwest, and due to its acquisition by long-distance provider Qwest, also has substantial nationwide business and Internet backbone operations.

> **based switches, extend IP functionality throughout the network, modify countless internal systems, and reconfigure its local and toll trunking network.**[33]

The existence of circuit switches is not the fault of regulators. The existing ILEC technology platform reflects investment choices made by telephone companies, based on the history of technology transformations affecting the PSTN. While regulators may impose obligations on ILECs, those obligations have been, to date, largely technology neutral. For example, ILECs met those obligations when utilizing electromechanical switches, and when that technology became obsolete, the obligations were met with the digital switches that replaced them. The challenges described by CenturyLink are not consistent with Dr. Kovacs' view that only regulatory constraints are hindering the technology transition. CenturyLink illustrates the **technological** foundation of the transition, and the **technology-related** obstacles that ILECs face (CenturyLink also illustrates the fact that it operates a single network during the transition). These obstacles are not the product of regulation, but of the fact that technology has changed. In the same way that electro-mechanical switching was replaced by digital electronic switches, ILEC investments are being shaped by technological progress.

In summary on the matter of regulatory obligations and ILEC investment, the evidence points to substantial investments being made by ILECs, some in fiber, others using advanced DSL technologies. There is no requirement that ILECs maintain "parallel networks," and investments ostensibly made in "legacy" plant are in many cases supporting broadband. Dr. Kovacs provides no reasonable evidence that lifting regulatory constraints would mitigate the technology-transition challenges faced by ILECs, or increase the pace of change or level of investment in broadband—fiber-based or otherwise.

The Relationship Between Switched and IP Traffic—Voice Still Matters

Dr. Kovacs points to the relationship between switched voice traffic and IP traffic, indicating that "the overwhelming majority of communication now takes place in IP."[34] As Dr. Kovacs concedes, however, the reason for the disparity is that most of the large volume of IP traffic is "IP video, either over the open Internet or managed."[35] Recent estimates show that Netflix and YouTube generate, respectively, 32.25 percent and 17.11 percent, respectively, of all IP traffic, i.e., approximately 50 percent of that traffic.[36] Because video files are very large—streaming high-definition video requires a data transmission rate equivalent to 75-100 simultaneous voice conversations, they swamp all other traffic volumes.[37] However, **all bits are not created equal**.

[33] CenturyLink Comments in WC Docket No. 12-353, January 28, 2013, pp. 3-4, emphasis added.

[34] Kovacs, p. 7.

[35] Kovacs, p. 7.

[36] See, for example, "Netflix Still Eats a Third of the Web Every Night; Amazon, HBO and Hulu Trail Behind," All Things D, May 14, 2013. http://allthingsd.com/20130514/netflix-still-eats-a-third-of-the-web-every-night-amazon-hbo-and-hulu-trail-behind/?reflink=ATD_yahoo_ticker

[37] https://support.netflix.com/en/node/306. Netflix recommends 5 Mbps downstream for HD video and 7 Mbps for Super HD quality. Voice can be transmitted at 64 kbps.

Dr. Kovacs argues that because there are so many non-voice bits circulating on IP networks, the relevance of voice is diminished.[38] This is an unreasonable perspective. The flood of IP-based video traffic does not diminish the importance of high quality voice services, nor does it diminish the complex issues that will arise as voice services are transitioned to an all-IP platform. Current TDM-based voice services provide a host of key functionalities, and these functionalities, crucial for consumers, must be migrated to the IP broadband platform. For example, no one has ever made a 911 call using streaming video. Likewise, the relatively small volume of TDM traffic, relative to all IP traffic, does not diminish the importance of the Federal Aviation Administration's air traffic control system, which is heavily reliant on TDM technology, and would not function if a flash-cut from TDM to IP were implemented.[39] In addition, the large volume of technologies that currently ride "over-the-top" on the PSTN, such as medical monitoring devices, alarm systems, and credit card verification systems, among others, all rely on the TDM-based PSTN. As noted by the FCC's Technology Advisory Council:

> Network providers have huge investments in existing PSTN infrastructure including copper wire, switches, pole space, and software. Although new information services are designed for IP networks, many homes and businesses still use devices that depend on specific characteristics of the PSTN (e.g., auto-dialers, alarm systems, ATMs, PoS terminals). These services and devices will have to be replaced and the accompanying construction and inspection "codes" revised.[40]

Dr. Kovacs never mentions the complex issues that must be carefully addressed to assure that critical services continue to operate. Not only will the transition from TDM to IP-broadband have the potential to directly affect consumers through the transformation of the telecommunications services provided by their local telephone company, but consumers may also be experience a wave of secondary effects if the competitive markets associated with functions that ride over-the-top of TDM networks are harmed. Those markets are competitive today precisely because of actions taken by the FCC to ensure that the TDM platform could be used to connect devices of the user's choice, and could also be used by rivals to deliver advanced services.[41]

Telephone numbering is another area of policy concern. In an all-IP world, telephone number conversions to IP will have to be made. At this time there is no telephone-number-equivalent of a Domain Name Server (i.e., the database that converts alphanumeric Internet addresses into the corresponding IP addresses).[42] Certainly, ensuring a smooth transition for telephone numbers is an important policy matter. Likewise, number administration in an all-IP environment may continue to require regulatory oversight.

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[38] Kovacs, pp. 6-7.

[39] See, for example, the comments of Harris Corporation, in the Federal Communication Commission's WC Docket No. 12-353, January 28, 2013, p. 2.

[40] FCC Encyclopedia, "Technological Advisory Council." http://www.fcc.gov/encyclopedia/technological-advisory-council.

[41] See, for example, Jonathan E. Nuechterlein and Philip Weiser, *Digital Crossroads*, 2nd Edition, Chapters 2 and 6.

[42] Work is ongoing on this issue. See, http://tools.ietf.org/wg/enum/draft-ietf-enum-3761bis/.

Of course, TDM will eventually be retired, like other telecom technology such as cross-bar switches, and all users will be migrated to IP-based systems. However, the complexity of the transition calls for an ongoing role for state and federal regulators and policy makers. Care must be exercised to ensure that vital services that rely on the TDM-based PSTN are not adversely affected through the transition. Arguing, as Dr. Kovacs does, that the 1% status of TDM voice as compared to all IP traffic requires the casting aside of policy objectives, such as those associated with universal service,[43] access to emergency services,[44] and network reliability[45] is unreasonable.

Continuity in the access to emergency services illustrates the importance of a careful TDM transition

Access to telecommunications facilities during emergency conditions is a long-standing public policy objective. The benefits to individuals, and to society as a whole, of rapid response in cases of emergency has led, through a partnership of state, federal, and local authorities, to a reliable system of access to emergency services. Policy makers have determined that the benefits of reliable access to emergency services exceed the costs of implementing the systems. For example, the need for reliable backup power has been recognized by policy makers as a key element of access to emergency services. Without reliable backup power, access to emergency services is undermined at the very time that people are more likely to need to access emergency personnel (i.e., during storms or other natural disasters when grid power fails). However, Dr. Kovacs does not see much point in continuing on this legacy path. Dr. Kovacs states:

> [T]he old solution of relying on reverse-powering from the central office to deal with power outages is no longer useful in most cases. That solution does not work over the "lines" that consumers most desire. Fiber-to-the-premise, hybrid fiber-coax, and wireless connections are unable to provide reverse-powering. Yet, these are the links more than 60% of consumers have chosen as their primary means of communication. It is clear that regulators cannot—and should not—**force consumers to reverse course**. Instead, regulation must catch up to the technology choices consumers have made. **Regulation must also acknowledge the reality that most consumers today rely on multiple infrastructures and thus, to a large extent, provide their own backup sources**.[46]

Dr. Kovacs' statement that reverse powering does not work on wireless and next generation wireline technologies is incorrect. In fact, even today, wireless switching offices are powered by backup generators and battery backup should grid power fail. However, some, but not all,

[43] Dr. Kovacs fails to identify any forward-looking universal service objective in her report. In fact, she favors the broadband deployment model utilized by Google, where the service provider has sole discretion to determine where advanced broadband services are deployed. (Kovacs, p. 23.)

[44] While conceding that access to emergency services continues to be important (Kovacs, p. 13), Dr. Kovacs fails to identify any forward-looking policy objective associated with the IP-broadband transition and access to emergency services in her report. She further argues that consumers should have the responsibility to provide their own back-up sources of access to emergency services. (Kovacs, p. 13.)

[45] As discussed immediately below, Dr. Kovacs states that ensuring continuity of network services should be left to consumers.

[46] Kovacs, p. 13, emphasis added.

wireless towers have generator-based backup power sources—which raises the important issue of whether towers should have better backup, or at least whether carriers should have plans in place, and adequate resources, to ensure that sources of backup power can be quickly moved to wireless towers in the event of longer term outages.[47] The policy question is how much it will cost to improve system reliability, and whether those costs are justified given the crucial role that robust wireless and IP broadband networks will play in the future. This question will not be correctly answered by service providers, because they will not account for the externalities associated with network failures during grid-power outages. Policy makers must determine the level of investment in back-up power and network reliability that will protect public safety.

The retirement of TDM-based systems should not lead regulators to abandon efforts to ensure that the IP-broadband and wireless networks of the present and future perform adequately in an emergency. This policy objective is technology-neutral. The question is not, as Dr. Kovacs suggests, whether consumers should be forced to "reverse course," but whether regulators should take proactive measures to protect lives and property, including the lives of first responders who place heavy reliance on the performance of telecommunications systems during emergencies. Dr. Kovacs is also incorrect when she asserts that consumers are capable of solving this problem on their own through "multiple infrastructures." As was made clear from the experience of Superstorm Sandy and the 2012 derecho storm, wireless and next generation IP-based technologies are not immune from simultaneous failure—multiple systems can easily fail, especially if they are not adequately backed-up in the first place.[48]

Consider also the transition to next generation 911 (NG911) services. NG911 has the potential to improve the reliability of emergency services, through enhanced redundancy and route diversity. However, if NG911 systems are fed by wireless and IP broadband systems that quickly lose **all** transmission capability following failures of grid power, the improvements to NG911 will be of little use. Here again, the key question is the value that society places on reliable access to emergency services, and the costs of improving wireless and IP broadband networks to enable those societal benefits. Dr. Kovacs apparently does not believe that such an evaluation is appropriate. Reasonable approaches to public policy suggest otherwise.[49]

Dr. Kovacs says leave it to the market—consumers have already figured it out as they buy multiple technology platforms.[50] (Never mind that Dr. Kovacs elsewhere points out that for

[47] The FCC recently released a NPRM that addresses this issue, among others, associated with the reliability of wireless networks. See, *In the Matter of Improving the Resiliency of Mobile Wireless Communications Networks, Reliability and Continuity of Communications Networks, Including Broadband Technologies*, PS Docket No. 13-239, PS Docket No. 11-60, Notice of Proposed Rulemaking, Released: September 27, 2013.

[48] See, for example, "FCC: 25% of cell towers, broadband down in 10 states," USA Today, October 30, 2012. http://www.usatoday.com/story/news/nation/2012/10/30/hurricane-sandy-wireless-cellphone-outage/1669921/. See also, "Impact of the June 2012 Derecho on Communications Networks and Services. Report and Recommendations, A Report of the Public Safety and Homeland Security Bureau Federal Communications Commission, January 2013 (*Derecho Report*).

[49] See, for example, *Derecho Report.*

[50] Kovacs, p. 15.

many consumers wireless is their sole source of both voice and broadband service.[51]) But multiple platforms, **none of which has reliable backup power**, are unlikely to provide an adequate solution.

In summary, Dr. Kovacs' discussion of the relative volume of voice traffic, as compared to the entire volume of IP traffic is a red herring. Public policy objectives associated with voice traffic will continue as we transition from TDM to IP-broadband.

Consumers do not have a "Plethora of Choices"[52]

Dr. Kovacs' argues that because of the "plethora of choices" facing consumers, regulatory obligations can be eliminated. There is no question that consumers today have more choices of telecommunications services than they did in the benchmark year of 1996. Consumers have adopted wireless mobility services in large numbers, with about 38% dropping their wireline voice connection entirely.[53] However, about 62% continue to maintain wireline telephone service provided by either a local telephone company, a cable company, or an "over-the-top" provider. Data from the National Health Interview Survey also points to geographic differences in wireline service adoption. This is not surprising, given that wireless coverage may be more limited outside of urban areas. Nationwide, non-metropolitan areas exhibit cord-cutting rates 7.6 percentage points **lower** than metropolitan areas (30.1 percent vs. 38.5 percent).[54] This indicates that approximately 70 percent of all households nationwide in non-metropolitan areas continue to rely on wireline voice services, and given the more limited reach of cable voice services outside of metropolitan areas, a substantial portion of these wireline voice services are provided by ILECs. While cord cutting is an option for some, there is little evidence that all households are willing or able to cut the cord.

Wireline broadband markets are not competitive

The fact that the majority of consumers continue to purchase both wireline and wireless services suggests that most consumers do not view wireless and wireline as outright substitutes for one another. However, when considering consumer choice, Dr. Kovacs extends the realm of beyond wireless and wireline platforms:

> Thus, consumers today enjoy an extraordinarily rich communications environment. The new mother who could only communicate with her Mom in 1996 via carefully budgeted long-distance calls today can show off the baby or get advice not only via a call from her

[51] Kovacs, p. 39.

[52] Kovacs, p.6.

[53] It is important to note that this evolution of "consumer choice" has been occurring in a highly negative economic climate. Many consumers are cutting the cord due to declining incomes, which reflects something less than the pure desire to be "wireless only." As reported by the authors of the National Health Interview Survey, consumer incomes affect cord cutting behavior: Adults living in poverty (54.3%) were more likely than adults living near poverty (45.9%) and higher income adults (33.2%) to be living in households with only wireless telephones. Stephen J. Blumberg, Ph.D., and Julian V. Luke, Wireless Substitution: Early Release of Estimates from the National Health Interview Survey, July-December 2012," June 18, 2013, Table 2, p. 3. http://www.cdc.gov/nchs/nhis/releases.htm#wireless

[54] Id., p. 9.

> landline or cellphone, but can Skype, text, email, tweet, use Facebook, or connect via myriad other ways that combine voice, data and video seamlessly, generally over the Internet.[55]

While it is certainly true that various communications applications are capable of running over-the-top of a broadband connection, they do not provide a stand-alone means of communicating. **The consumer must have a broadband connection to utilize those alternatives**. For most consumers, the underlying technology platform associated with wireline broadband is a "duopoly" at best, i.e., the consumer has a choice of either the local telephone company or the local cable company.[56]

Economic theory tells us that it is unreasonable to expect robust price competition in duopoly markets. In duopoly markets, firms recognize mutual interdependence of their actions, and will likely find it profitable to jointly raise rates, and it is it is widely understood that duopoly markets do not deliver the economically efficient competitive outcome.[57] An excellent illustration of the impact of duopoly, and the outcomes when the duopoly was finally eliminated, can be seen by considering the market for wireless mobility services.

Initially, the FCC issued only two cellular licenses in each wireless market area. One license was offered to the incumbent telephone company, with the second made available to another qualified applicant.[58] While the FCC's approach to licensing at least opened the potential for some degree of rivalry, a competitive outcome was not forthcoming. Rather, the duopoly cellular firms recognized their mutual interdependence and jointly raised prices, and shunned efforts to deliver high-quality service.

The performance of cellular duopoly markets has been examined by academic researchers, who have found that market competition was not evident from the data:

> The evidence suggests that cellular prices are significantly above competitive levels. . . .it appears from our study that certain firms nevertheless obtain higher-than-normal rents, given such an industry structure. . . .[I]n markets where independent operators face each other exclusively. . .we find outright cartel pricing.[59]

Similarly, the U.S. Department of Justice's investigation of cellular markets led it to conclude:

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[55] Kovacs, p. 44.

[56] According to the most recent data available from the FCC, 90% of households reside in areas where no more than two fixed broadband providers are capable of delivering speeds of 6 Mbps downstream. Federal Communications Commission, "Internet Access Services: Status as of June 30, 2012," Industry Analysis and Technology Division, Wireline Competition Bureau, May 2013, p. 9. http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-321076A1.pdf.

[57] See, for example, Carlton, Dennis, and Jeffery Perloff, *Modern Industrial Organization*, 4th Ed. Pearson Addison Wesley, 2005, pp. 161-170.

[58] See, for example, Berresford, John. "The Impact of Law and Regulation on Technology: The Case History of Cellular Radio," *The Business Lawyer*, Vol. 44, May 1989, p. 727.

[59] Parker, Philip and Lars-Hendrik Roller. "Collusive Conduct in Duopolies: Multimarket Contact and Cross-Ownership in the Mobile Telephone Industry," *The RAND Journal of Economics*, Vol. 28, No. 2, Summer, 1997, p. 321.

> The Department's extensive investigations into the cellular industry . . . indicate that cellular duopolists have substantial market power . . . . The basic structural problem with cellular markets is well known -- the fact that they are and have been duopolies with (at least until very recently) absolute barriers to entry. While the FCC's decision to issue two cellular licenses -- rather than only one -- was motivated by a desire to stimulate competition, . . . two firm markets are not particularly competitive. The noncompetitiveness of two-firm markets is exacerbated here by the overlapping alliances of the cellular carriers, so that firms that "compete" with each other in one market are partners in another.[60]

Eventually the FCC increased the number of licenses available in wireless markets, entry was encouraged, and price competition broke out. Consumers reaped the benefits of the competition through lower prices.[61] Duopoly is not competition, and given the underlying broadband duopoly, the "plethora" of competitive choices alleged by Dr. Kovacs certainly does not exist for wireline broadband services.[62]

Wireless broadband alternatives are metered and costly

Dr. Kovacs points to the potential for consumers to substitute wireless LTE for wireline broadband.[63] She concludes that "for nearly half the users of fixed broadband Internet access, mobile wireless Internet access may well be competitive with fixed wireless access on usage."[64] Apparently conceding that the other half does not face this competitive choice, Dr. Kovacs' conclusion does not reasonably reflect wireline usage and the resulting price points facing consumers who might consider wireless broadband as a substitute for wireline.

As Dr. Kovacs notes, median wireline broadband usage is 18 GB per month.[65] For the median consumer, and for consumers well below the median, cutting the wireline broadband cord would result in extremely high bills for LTE services. For example, a 12 GB "share everything" plan (i.e., a plan is two-thirds of the median wireline usage) from Verizon wireless costs $70 per month, well above the price of many DSL and cable broadband offerings. Thus, Dr. Kovacs is

[60] Memorandum of the United States in Response to the Bell Companies' Motions for Generic Wireless Waivers, at 14-15, *United States v. Western Electric Co*., Civ. Action No. 82-0192 (HHG), D.D.C., filed July 25, 1994 (quotation marks, citations, and punctuation omitted), cited *In the Matter of Implementation of Section 6002(B) of the Omnibus Budget Reconciliation Act of 1993 Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services*, First Report, ,10 FCC Rcd 8844; FCC 95-317, released August 18, 1995.

[61] For example, the Consumer Price Index for wireless services decreased 31 percent between 1997 and 2001. (CPI data available at: http://www.bls.gov/cpi/data.htm.) Since the market entry period in the late 1990s and early 2000s, wireless market consolidation has sapped some of the strength of price competition in wireless market. The six nationwide carriers that emerged in the 1990s (AT&T Wireless, Cingular, Nextel, Sprint, T-Mobile, and Verizon Wireless) have now consolidated into four, and numerous regional providers have been absorbed by the remaining four nationwide carriers. While the FCC and the Department of Justice thwarted AT&T's attempt to merge with T-Mobile, the case that the current status of the wireless market reflects robust competition is less than compelling.

[62] As is also discussed below, the availability of LTE-based wireless broadband does not provide a reasonable substitute for wireline broadband—metered wireless broadband rates will result in very high costs for most consumers.

[63] Kovacs, pp. 42-43.

[64] Kovacs, p. 43. What about the other half (for whom wireless is not competitive)?

[65] Kovacs, p. 43.

wrong about wireless broadband being a reasonable alternative for "nearly half" of consumers.[66] While some consumers may forgo a wireline broadband connection (especially if income constraints leave broadband cord cutting as their only option), to claim, as Dr. Kovacs does, that one-half of all households would find LTE a suitable substitute for wireline broadband is not a reasonable conclusion.

Dr. Kovacs also points to Wi-Fi as providing a competitive alternative to wireline broadband, stating that "Wi-Fi will soon overtake hard-wired delivery…"[67] Dr. Kovacs' statement displays a fundamental misunderstanding of how broadband networks operate. She is apparently unaware of the fact that **all Wi-Fi connections rely on wireline broadband connections.** Wi-Fi does not provide an independent source of competition for wireline broadband. Rather, it only extends a wireline broadband network's edge to enable the connection of wireless devices.

Internet peering and transit do not reflect market condition in last-mile networks

Dr. Kovacs argues that peering and interconnection arrangements associated with the Internet provide proof that regulatory oversight is no longer needed in an IP-broadband world:

> This unregulated system (of commercial agreements in IP networks) has worked extraordinarily efficiently and effectively across the U.S. and across the globe, with the supply of bandwidth meeting demand, however rapidly that demand has grown.[68]

While it certainly is true that global IP backbone networks have generally worked out interconnection and transport of traffic issues without the need for regulatory intervention,[69] Dr. Kovacs conflates the backbone network experience with last-mile broadband access networks. As discussed already, market power is an issue with these networks, and the global experience with oversight of broadband access networks is decidedly much more regulatory. For example, Japan and the United Kingdom have each required fiber unbundling, and other nations impose open access requirements on last-mile broadband.[70] Dr. Kovacs incorrectly lumps together

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[66] Furthermore, Verizon's overage charges are $15 per GB, introducing substantial risk of bill shock for consumers who might try to substitute LTE for wireline. For the median usage consumer the monthly cost of broadband using Verizon's LTE would be $160, well above broadband prices for wireline broadband. Of course, considering the price point alone is not sufficient. Wireless broadband services have more restrictive terms of use, and have inferior performance characteristics as compared to wireline networks.

[67] Kovacs, p. 45.

[68] Kovacs, pp. 8-9.

[69] There have been "bumps in the IP peering road," with the occasional de-peering, or threat thereof. See,

"Level 3/Comcast Dispute Revives Eyeball vs. Content Debate," Telecompetitor, November 30, 2010, http://www.telecompetitor.com/level-3comcast-dispute-revives-eyeball-vs-content-debate/ .

See also, "Peering Dispute Between Cogent, Sprint," Data Center Knowledge, October 31st, 2008. http://www.datacenterknowledge.com/archives/2008/10/31/peering-dispute-between-cogent-sprint/;

"Cogent Unplugs Telia in Peering Dispute," Data Center Knowledge, March 16th, 2008, http://www.datacenterknowledge.com/archives/2008/03/16/cogent-unplugs-telia-in-peering-dispute/;

"ISP spat blacks out Net connections," InfoWorld, October 6, 2005, http://www.infoworld.com/t/networking/isp-spat-blacks-out-net-connections-492.

[70] See, Ofcom, "UK broadband competition reaches new milestone," April 25, 2013

broadband access markets and IP backbone markets when assessing global IP-broadband markets and regulatory intervention. The level of competition and market performance of last-mile broadband markets should be separately assessed by regulators, and remedial action may be required if those markets are observed to perform poorly, thus harming consumers.

In summary, Dr. Kovacs' perspective on competition, while focusing on consumers' ability to choose from many alternatives that may ride over-the-top of a broadband connection, ignores the dearth of competition in the underlying broadband market. Furthermore, for consumers who desire a high-quality broadband connection, the DSL-based services of many telephone companies are less likely to be satisfactory, leading to only one plausible choice—cable broadband. For those consumers that demand high quality broadband, but who reside in areas where cable does not serve, broadband market failure is the outcome—consumers have little choice but to utilize telephone-company DSL, if that option is available.[71]

Conclusion

The transition to all-IP broadband networks is underway. However, this transition does not eliminate the underlying public policy objectives that regulators have promoted associated with affordable rates, high quality services, 911 access, or broadband deployment. It is reasonable to anticipate the ongoing need for policy oversight of the TDM/IP-broadband transition, and the need for a reasoned determination of when regulation may be needed to correct market failures, or enable rapid resolution of conflicts. Dr. Kovacs' conclusion that "liberating" ILECs from regulatory oversight will produce additional investment and result in the optimal outcome is not reasonably supported. The policy objectives that have been fulfilled through the TDM-based PSTN will continue to be valid in the post-TDM world. The following areas continue to require the attention of policymakers, regardless of the technology that is utilized to provide critical telecommunications services:

Affordability: Broadband and wireless services are increasingly viewed as necessities. Policy makers should consider whether steps are necessary to mitigate affordability concerns.

Limited Competition: Duopoly wireline broadband markets, and consolidating wireless markets, should be monitored to determine whether markets are delivering economically efficient outcomes.

Reliability and Service Quality: Legacy wireline voice networks have delivered reliable and high quality service, providing value to consumers and contributing to the fulfillment of critical public safety objectives. As broadband and wireless are now viewed as necessities, reliability and service quality standards for these technologies must be addressed.

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http://media.ofcom.org.uk/2013/04/25/uk-broadband-competition-reaches-new-milestone/ . See also,

OECD (2013), "Broadband Networks and Open Access", OECD Digital Economy Papers, No. 218, OECD Publishing. http://dx.doi.org/10.1787/5k49qgz7crmr-en.

[71] Satellite broadband while being available, at least in theory, everywhere, is metered and much more costly than terrestrial wireline services. Furthermore, satellite broadband suffers from much higher latency, due to the long round-trips of data sent from the user to the satellite, which is located in an orbit approximately 22,300 miles above the equator. The increased latency results in diminished performance for some over-the-top applications, especially over-the-top voice services.

Access to Emergency Services: The transition to an alternative technology platform does not reduce the importance of robust access to emergency service providers. Policy makers should monitor the oversight of the transition to IP-broadband, and ensure that the benefits associated with high-quality systems continue. The issue of backup power also requires careful attention.

Carrier of Last Resort and Universal Service: Carrier of last resort obligations, the requirement that local telephone companies make service available to all households in their service area, have ensured that affordable and reliable telephone service is available on reasonable request to all households. While voice services have been subject to COLR obligations, broadband services are not. Going forward, access to affordable, high-quality broadband services will be as important as access to legacy voice services has been. Determining how COLR costs will be recovered, and the criteria required to ensure broadband availability will be critical.

Informed Consumers and Consumer Education: During the TDM "retirement" and transition to IP-broadband, policy makers should ensure that educational efforts are ongoing, so as to inform consumers of changes and the potential impact of changes, and to promote an open dialog regarding consumer needs during the transition.