Testimony of Harold Feld
Senior Vice President
Public Knowledge

Before the
U.S. House of Representatives
Committee on the Energy and Commerce
Subcommittee on Communications and Technology

Hearing On:
The Evolution of Wired Communications Networks

Washington, DC
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Chairman Walden, Ranking Member Eshoo, thank you for inviting me to testify today. My name is Harold Feld, and I am Senior Vice President for Public Knowledge, a nonprofit public interest organization that promotes the public's access to information and culture through open, competitive, and universally accessible and affordable communications networks.

Introduction

Our telephone network has long been the envy of the world. According to the Federal Communications Commission's (FCC) most recent report, more Americans have access to basic voice communication than ever – with a stunning penetration rate of nearly 96% of the population.[1] We rely on the telephone network every day for the most basic social, economic and public safety needs. Whether it's something as mundane as a call to order take out for dinner, as personal as a call to Grandma on Mother's day, or as vital as calling 9-1-1 in the middle of the night, Americans count on the phone system working the same way day in and day out.

Likewise, our economy rests on the same bedrock belief that that the phone network works reliably anywhere in the United States no matter what network or device we use for the call. A small business using a traditional copper line doesn't worry about reaching a potential customer on a cell phone or a supplier using an IP-based network. We count on our calls, our faxes and our text messages getting through to where we send them without a moment's thought.

We have enjoyed the benefits of a ubiquitous, reliable, affordable telephone network for so long that we take it for granted. We have forgotten that these things did not happen by accident. The telephone system we rely on today works the way it does because we made policy choices based on our fundamental values. The features of the phone system we depend on: service to all Americans, interconnection and competition, consumer protection, reliability and public safety could disappear tomorrow if we decide these values no longer matter.

Before we rush into decisions about what rules to throw away and what to keep, we need a framework based on values to tell us where we want to go.

[1] "FCC Releases New Telephone Subscribership Report," August 13, 2013. Available at: http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-292758A1.doc

That can't happen if we deregulate first and ask questions later, as some have urged. Laws and rules are means to an end, not ends in themselves. It is our values that tell us what we need to keep, what to modify, what to add, and what to discard. For example, how does a principle that we "not apply old monopoly era rules" help us solve the rural call completion problem? Do we want to get rid of the requirement that law enforcement must secure a warrant to listen to our calls, or do we think consumers will be happier with the NSA listening to IP-based calls but only getting metadata from traditional phone calls? Will consumers be happier with caller I.D. spoofing, cramming, and other anti-consumer practices post-transition so that we should eliminate the ability of the FCC or state agencies to protect them?

The dialog so far has too often focused on wish lists and special interest pleadings. Even those claiming to support technical trials, while providing plenty of detail as to what rules they would like eliminate, have not provided any actual trial proposals or statements of what they would test. Similarly, those opposing trials have by and large made it clear that they oppose trials because of their possible impact on policy.

If this were a new vaccine, no one would seriously say "we've done vaccines for centuries, we don't need clinical trials!" Nor would a manufacturer argue that the best way to test a new vaccine would be to allow them to sell it, without a prescription requirement, in 5 random markets. Yet that is the state of debate around technical trials for the phone system on which we all rely.

We need a vaccination against "telecom lawyer disease" that sees this transition solely in terms of rules and laws. At this early stage, we need to focus on how to plan out a transition that reflects our fundamental values and works as an upgrade for everyone, not an upgrade for some and a downgrade for others. We need to recognize the phone system is a network, where we all have a shared benefit from it reaching everyone and therefore a shared responsibility to make it work for everyone.

To make this work, we need to keep the Federal Communications Commission as the central coordinator. We need to leave the FCC with sufficient authority to keep track of what's going on and to fix problems as they arise. While we should continue to expect that the transition will remain largely industry-driven, someone must make sure we don't accidentally drive off a cliff.

Other federal agencies must begin to seriously consider their own transition plans, as evidenced by filings from the Department of Defense[2] and the Federal Aviation Authority (FAA) communications contractor Harris Corporation.[3] Likewise the states and localities must remain engaged and begin their own planning. The Federal government, states and localities are

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[2] Comments of United States Department of Defense and All Other Executive Agencies, Docket No. 13-5, Filed July 8, 2013 ("DoD Comments") available at http://apps.fcc.gov/ecfs/document/view?id=7520928837.

[3] Comments of Harris Corporation, Docket No. 12-353, Filed January 28, 2013 ("Harris Comments") available at http://apps.fcc.gov/ecfs/document/view?id=7022113466.

consumers of telephone services and are equally dependent on a reliable, ubiquitous affordable telephone network to conduct their daily business and meet emergency needs.

Nor can anyone imagine that the FCC will "control" the transition. Something this vast cannot have a central choke point. But it does require a central coordinator. That role belongs to the Federal Communications Commission, and will continue to do so for the foreseeable future.

A History Of Values Stretching Back To The Founding of the Republic

The United States has consistently led the world in developing communications technologies because we begin with a fundamental value – all Americans should be able to communicate with each other. Article I Section 8 of the Constitution establishes the authority and the duty of Congress to "establish post offices and post roads," and George Washington appointed the first Postmaster General to his cabinet. From the beginning, we recognized that our future as a country depended on making sure all Americans could communicate with each other for purposes of culture and commerce.

As we moved from the mail to the telegraph to the telephone we have updated that fundamental value as we updated our technology. Almost exactly 100 years ago, we enshrined the principle in the Kingsbury Commitment which established that AT&T must give interconnection rights to rival rural providers, and accept certain other responsibilities in exchange for a monopoly to serve the country.

More than 40 years after we broke up the AT&T monopoly, Section 1 of the Communications Act still begins with this proud expression of our single most important value: "to make available, so far as possible, to ***all*** people of the United States" the benefits of our communications network.[4] And 40 years later, we still depend on the federal and state governments to give expression to this value and make this commitment a reality. As a result, more people than ever now enjoy access to basic voice service, with 96% of the country subscribing to some form of voice.

Why Voice Still Matters

It has become fashionable to look on voice communications as "just another application" in an IP network, unworthy of any special consideration and needing no additional protection than access to Facebook. This is, in a word, absurd.

As noted above, ***nearly 96% of the country subscribes to a basic voice service***. Yes, many people now also communicate with other technologies, using a plethora of devices. People like choices. But the delusion that the rise of these new technologies renders plain old voice communication obsolete is demonstrably false. How on Earth can any rational person dismiss a system to which 96% of the country still subscribe as anything other than fundamental to our daily lives? No other technology even comes close to this level of ubiquitous adoption.

[4] 47 U.S.C. §151 (emphasis added).

Even if we were to consider only traditional copper POTS (Plain Old Telephone Service), that still leaves ***100 million people***, as well as millions of small businesses, relying on the service. According to even the most enthusiastic industry cheerleaders of the IP Transition, five percent of the country continues to rely exclusively on POTS. That translates to 15 million people dependent on POTS alone. A remaining 85 million people keep their POTS line *despite also having a mobile phone*.

At a time when too many American families struggle to make ends meet, we can safely assume that the bulk of these POTS/mobile customers keep their POTS line because they feel they need it, not because they perversely enjoy writing two checks for voice service. Certainly consumers embrace choices, and find the right combination of technologies and services that works for them. But we are not talking about consumers selecting mobile or IP technologies as a choice in addition to, or in place off, traditional copper networks. We are talking about eliminating traditional phone service entirely.

We are dealing with the technology that remains the foundation on which many of the additional technologies rest. To approach this exercise with the cavalier attitude that "the market" has chosen and we can safely shut down a system on which 100 million people still directly depend courts disaster.

The Five Fundamentals Framework

Public Knowledge has identified Five Fundamental Values that have defined our communications network and created the communications network on which we all rely.

Service To All Americans. As discussed above, this principle has applied to the telephone network for 100 years, and to earlier technologies since the founding of the Republic. From a rational self-interest perspective, we all benefit from a network that reaches everyone. I might never call someone in rural Tennessee, but the fact that I could if I needed to has value to me as well as to the citizen of rural Tennessee who can reach the rest of the country.

Interconnection and Competition. We developed the principle of interconnection 100 years ago to ensure universal service. At its heart, interconnection means making sure calls from one network can terminate on any other network. This principle includes not only the narrow meaning of the term as defined by Sections 251 and 252, but the broader concept that traffic from one network must flow to another network and that the receiving network has an obligation to terminate these calls.[5]

[5] Even during the days of regulated monopoly, AT&T was required to offer interconnection to other telecommunications companies to ensure universal access and the smooth operation of the telephone network. In this regard, it is noteworthy that the oral argument on network neutrality last month spent considerable time focused on the question of whether a general "no blocking" rule that required Internet carriers to terminate each other's traffic, even without regulating terms, constituted common carrier interconnection.

As we have increasingly depended on competition among networks, we have increasingly depended on interconnection to ensure service from one network to another. In the absence of interconnection, competition puts vital services at risk. Even without anti-competitive intent, Congress found it necessary to order interconnection between IP-based providers and ILECs to ensure reliable 9-1-1 access.[6]

In addition, we have in the last 50 years adopted numerous regulations to promote competition in every aspect of the network. This includes everything from *Carterfone* and the right to attach devices to the network to the computer proceedings that allowed competing services such as alarm companies to exist, to local number portability that allows consumers to move seamlessly from cable to wireless to POTS at will. As we move forward, we must consider what competition we wish to see, and what rules, if any, we need to maintain it.

Consumer Protection. We have long recognized that basic voice service is not like buying a toaster or even subscribing to cable. We have long considered basic voice so essential to participation in society that we have developed significant protections above and beyond what consumers expect from routine services and goods. These range from the expectation that the government will not listen to our calls without a warrant to guarantees of voice quality to truth-in-billing rules.

Anyone who believes that consumers no longer value these protections need only look at the outrage generated by phenomena such as "bill shock." It would be rash indeed to assume that the willingness of some consumers to make tradeoffs they would rather not make to enjoy the benefits of new technologies means that they look forward to a world governed by *caveat emptor* – let the buyer beware.

As we move through the IP transition, we must consider how to keep consumers whole. The DTV transition provides a very useful model. As part of the transition, the government subsidized the purchase of converter boxes so that consumers would not have to buy expensive new televisions or subscribe to MVPD services if they wished to continue to rely on free over-the-air television.

As the IP transition renders fax machines, credit card readers, and other embedded equipment useless, we must consider how to keep consumers caught in the transition whole.

In addition to keeping consumers financially whole, we must preserve fundamental privacy protections that protect our confidential personal and business information. Consumers continue to use the telephone for communications that are too confidential for email or other means of electronic information. The outrage expressed by consumers over the NSA acquisition of their metadata, even without looking at the actual content of the call, demonstrates how highly consumers value this information. As discussed below in the context of unauthorized release of unlisted phone numbers, protection of consumer privacy on the phone network can literally be a matter of life and death.

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[6] See Next And Emerging Technologies 911 Improvement Act of 2008, Pub. L. 110-283.

Reliability. Above all else, we count on the phone system to work reliably. Enter 10 digits and you reach the same number every time. When we can't reach our loved ones, we worry. If we can't reach clients, we lose valuable business opportunities. And if we cannot reach 9-1-1 in a crisis, we may die.

There are certainly tradeoffs in the nature of reliability between IP based services and traditional copper POTS. This is not a question of better or worse, or more reliable or less reliable. It is a question of how to balance these tradeoffs. Perhaps most importantly, it is a question of recognizing what new vulnerabilities we may introduce as we transition our communications networks, and how we address these vulnerabilities both technologically and with American consumers.

Public Safety. The National 9-1-1 system is perhaps the most obvious public safety element of the traditional telephone network that we will want to migrate to the new IP-based networks. But it is not alone. As filings by the FAA's communications contractor Harris Corporation indicate, the FAA depends on existing POTS for critical functions.[7] The Department of Defense has likewise filed comments with the FCC to underscore how changes in the underlying technology of the phone system could, if not carefully managed, threaten operations essential to our nation's security and the operation of critical government services.[8]

False Choices and Real Dangers

Unfortunately, rather than seriously assess the challenges of the transition and the steps needed to make it a success, parties have portrayed this as a series of false choices.

First, to ask whether we "should" transition is absurd. We *are* transitioning. Already our communication system consists of a mix of technologies, and technological and economic factors are driving TDM Providers to gradually convert to IP-based systems. The only question is whether we will transition in a mindful way or if we will continue to ignore the potential pitfalls.

More importantly, to frame this transition as primarily about regulation obscures the most important concern of the transition: ***the phone system must keep working***. The blithe assumption that nothing can go wrong and therefore we should focus exclusively on how to rationalize our current patchwork of regulation with its artificial distinctions based on technology ignores the very real problems that confront us. Law and regulation are means to an end, not ends in themselves.

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[7] Harris Comments at 5-6. *See also* Letter of Patrick Sullivan, Government Affairs, Harris Corporation to Marlene H Dortch, Secretary, Federal Communications Commission, Docket No. 13-5 (filed September 20, 2013) available at http://apps.fcc.gov/ecfs/document/view?id=7520944815.

[8] DoD Comments at 4.

Similarly deregulation is not an end in itself. We have no evidence that existing regulations place any sort of barrier to the ongoing transition effort. To the contrary, as those seeking regulatory relief constantly point out, the pace of the conversion has proceeded steadily over the years. We do not need to "bribe" carriers with promises of regulatory relief to make the transition a reality.

On the other hand, as we have already seen, a market driven transition on its own will not protect the traditional values that have formed the fundamental basis for our relationship with our communications network. As discussed below, we are already seeing warning signs that a purely market-driven transition will be an upgrade for some, but a downgrade for others. We must now decide whether as a nation will abandon our more than 220 years of recognizing the role of government in protecting fundamental principles in our communications network, and how abandoning that tradition would make us weaker as a nation.

The Transition Has Already Brought Challenges That Underscore the Need For A Value-Based Framework.

As a nation, we have been building to this transition since the passage of the Telecommunication Act of 1996. Indeed, we should rightly regard our current landscape of new technologies and new choices as a testament to the 1996 Act's success. As Congress intended, pro-competitive regulation made possible new competitors and new technologies. A shift from rate-of-return regulation preserving a static market to interconnection requirements, local number portability and other changes enabling competitive entry has created whole new classes of competitors offering new services.

Unfortunately, the blessings of this new world do not fall evenly on everyone. In urban areas, those who can afford premium prices have their pick of services that would have seemed like science fiction when the 1996 Act passed. But it takes only a short drive from the urban center to less populated areas to see that many communities in America are moving backward, not forward. And even in urban areas, the new competition does not always bring lower prices or new services to vulnerable populations.

In recent years we have seen no shortage of industry reports and techno-enthusiasts celebrating the inevitable march to IP technologies as an upgrade for all, driven by the magic of the market. We see an endless recitation of statistics showing the decline of traditional copper lines and the embrace of IP-based and wireless alternatives. Certainly this market shift has made the transition from traditional Time Division Multiplexing (TDM) to newer, less expensive IP-based technologies inevitable. But has this technological upgrade addressed all our traditional social values that lie at the heart of our social contract with the phone system?

Even a cursory examination shows that while the technology changes, the needs remain the same. We must decide whether we no longer care about the traditional values that have formed the basis of our relationship with our phone system for the last 100 years, or whether we still need government to play an important role in making these fundamental values a reality.

The IP Transition Does Not Guarantee Affordable Service To All Americans

As noted above, the most fundamental principle that has served as the foundation of our relationship with our communication system for more than 220 years is the concept of affordable service to all Americans. The IP Transition holds tremendous promise to provide benefits for all. But we have already seen disturbing signs that without government oversight guided by a values-driven framework, the transition will not be the universal upgrade we hope for and expect. Rather, it could very easily become a downgrade for rural Americans and vulnerable populations.

Case study: Salem County & Stow Creek, NJ

We think the blessings of the IP transition reach everywhere but the most remote regions of the United States. But as the story of Salem County and Stow Creek demonstrates, you don't need to get too far off the main highway to miss out on the benefits of the last 15 years.

In May 2012, the New Jersey Board of Public Utilities (BPU) held a public hearing in response to complaints that Verizon had failed to provide any broadband access for the local population. A packed hearing room informed the BPU that basic telephone service had degenerated to the point of unreliability that put people's lives at risk. Customers talked about the inability to reach 9-1-1, 'humming' on the line, and lengthy response time for service calls.[9]

Why didn't the residents of Stow Creek switch to a better provider? Because no other provider offered a competitive alternative. They had no cable provider to offer competing service. Wireless providers did not deploy sufficient towers to make wireless service reliable. The wonders of the IP transition had utterly passed them by. Due to rational decisions on whether it made sense to invest in maintenance, even conventional POTS service continued to degrade.

Stow Creek sits approximately 50 miles south and east of Comcast's corporate headquarters in Philadelphia, and approximately100 miles from Verizon's corporate headquarters in Basking Ridge, New Jersey. The region has a population of 5,000 people. But it was still too "rural," and the population too small, to provide incentive for Verizon to upgrade to IP or even maintain basic traditional copper service without pressure from regulators.[10] Nor could they attract potential competitors such as Comcast to want to serve in the first place. Only

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[9] Lauren T. Taniguichi, "Stow Creek, Greenwich, and Salem County Residents At Verizon Hearing: Can You Hear Us Now?" South Jersey Times (May 10, 2012) available at: http://www.nj.com/cumberland/index.ssf/2012/05/stow_creek_greenwich_salem_cou.html (last visited October 20, 2013).

[10] *See* Lauren T. Taniguichi, "Verizon Asserts Broadband Commitments Have Been Met Despite Complaints From Stow Creek, Greenwich," South Jersey Times (April 15, 2012) available at: http://www.nj.com/cumberland/index.ssf/2012/04/verizon_asserts_broadband_comm.html (last visited October 20, 2013).

when confronted by the possibility of a BPU Order did Verizon agree to upgrade Stow Creek to FIOS and provide new IP-based services.[11]

If "the market" will not serve Stow Creek, a short drive from the two largest and most sophisticated communications providers in the country, how can we count on "the market" to serve rural America? Alternatively, we can decide we no longer care about serving communities where providers see no business case. In which case, whether or not people in rural America can make phone calls does not trouble us for the IP transition.

Case Study: Prices For Basic Services Rise, Hurting The Most Vulnerable.

Even where competition thrives, the most vulnerable populations can still suffer. In 2006, California deregulated most of its basic telephone services. As price caps for basic service phased out, prices for basic phone services rose at double-digit rates.[12] Even granting that prices prior to deregulation were artificially too low for sustainability, one cannot deny that a sudden spike in prices for basic voice service falls most heavily on the most vulnerable.

If we believe that competition generated by the IP transition cures all ills, we must resign ourselves to the reality that even basic voice service may become too expensive for those who most need it. The problem becomes even more acute when we consider that many competitive providers, such as cable operators, provide competing voice service only as part of a bundle of other, higher priced services. Voice service that is cheaper only as part of a bundle you can't afford is not cheap voice service – at least not for those who need it most.

The IP Transition Does Not Always Provide Consumer Protection Or Ensure Emergency Services.

The example of Stow Creek shows that the blessings of the IP transition have been distributed rather unevenly and even places we would imagine as having a wealth of competitors can lose even basic service. The California example illustrates that even with competition, the transition can still drive up prices for the most vulnerable.

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[11] *See* Don E. Woods, "Verizon Promises Fiber Optic Network Will Come To Stow Creek," South Jersey Times (June 13, 2013) available at: http://www.nj.com/cumberland/index.ssf/2013/06/verizon_promises_fiber_optic_network_in_greenwich_and_stow_creek.html (last visited October 20, 2013)

[12] *See* James Temple, "AT&T Rates Skyrocket Since Deregulation," San Francisco Chronicle (January 18, 2013) available at: http://www.sfgate.com/technology/dotcommentary/article/AT-amp-T-rates-skyrocket-since-deregulation-4204388.php (last viewed October 20, 2013); David Lazarus, "Getting Hung Up On Basic Phone Rate Increases," Los Angeles Times, (January 27, 2010) available at: http://articles.latimes.com/2010/jan/27/business/la-fi-lazarus27-2010jan27 (last visited October 20, 2013).

Two more examples from California provide disturbing evidence that the availability of new technologies and competition do not guarantee consumer protection or even the basics of public safety on their own. Indeed, they indicate that relaxing regulatory oversight – even without entirely eliminating it – can raise serious problems that threaten people's lives.

Case Study: Decline of Wireless Location Accuracy

CalNena is a California non-profit organization that supports 9-1-1 service in the state of California. On August 13, 2013, CalNena released a report documenting significant decline in the accurate transmission of location information by wireless 9-1-1 calls since 2008.[13]

In other words, at the very time that reliance on wireless and other non-traditional voice services was going *up*, the reliability of 9-1-1 service was going *down*. But it is this very shift from traditional TDM service to wireless and IP alternatives that is supposed to justify eliminating regulatory oversight altogether because "the market has chosen."

I have not conducted any surveys, but I am fairly certain that consumers do not choose to have less reliable 9-1-1 service as a consequence of choosing an IP-based or wireless provider. To the contrary, consumers expect that when they switch from traditional TDM service to IP-based services or mobile services, 9-1-1 will remain reliably accessible. On the one recent occasion where a provider was required to inform customers that the shift from traditional copper service to wireless service could possibly result in less reliable access to 9-1-1, Verizon's recent effort to offer Voice Link as a substitute for wireline service on Fire Island, customers and first responders reacted negatively and vociferously.[14]

Case Study: Comcast Discloses 74,000 Unlisted Numbers Of Its California Residential Customers.

As documented in a recent Order by the California Public Utility Commission (CPUC), Comcast appears to have accidentally released to the public 74,000 unlisted numbers between 2009 and 2013. As explained by the CPUC, Comcast appeared slow to identify the problem, to

[13] CalNena, "New Data Show More Than Half Of California's 9-1-1 Calls Are Delivered Without Caller Location Information," August 13, 2013. Available at: http://www.calnena.org/communications/To-FCC-08-12-2013/CALNENA-Press-Release-081213.pdf (last visited October 20, 2013).

[14] *See, e.g.*, Dan Bobkoff, "Residents Forced To Live Without Landlines," National Public Radio (July 22, 2013) available at: http://www.npr.org/2013/07/22/204501411/residents-forced-to-live-without-landlines (last visited October 20, 2013); Jodie Griffin, "As Consumer Complaints Keep Streaming In, FCC Should Not Automatically Approve Verizon's Voice Link," Public Knowledge (July 22, 2013) available at: http://publicknowledge.org/blog/consumer-complaints-keep-streaming-fcc-should (last visited October 20, 2013).

respond to customer complaints, or to alert the CPUC as to this violation of customer privacy.[15] When pressed by CPUC staff to cooperate with the investigation into possible rule violations, Comcast asserted that recently passed California law prohibiting regulation of IP-based services barred the CPUC from exercising authority.

No one would imagine for a moment that Comcast intended to release this information. Nevertheless, it is equally absurd to suppose that because customers embraced Comcast's IP-based voice service that they had "chosen" to have their unlisted numbers released. To judge by the customer complaints included in the CPUC staff report, Comcast customers reacted to this breach of privacy with considerable shock and concern. Many of the complaints involved significant threats to the safety of subscribers.[16]

The question facing us in the IP Transition is not whether Comcast should have done a better job (Comcast itself reports that it has taken remedial steps to prevent these sorts of disclosures in the future). The question is whether we are content to leave protection of this sort of information to market incentives alone, or whether information about phone numbers and other customer information remains sufficiently sensitive that – like financial and health information – we provide consumers with additional oversight and protection. If we intend to leave customers without the additional protections they have long enjoyed, we need to warn them that companies can accidentally release their private information to abusive former lovers, wanted felons, and others with no consequences other than the fear that customers will take their business to another provider – assuming they find out about the release at all.

New Networks, New Problems: The Rise Of Network Neuropathy

Every network has its own unique set of vulnerabilities. In the wake of Superstorm Sandy, we have debated whether IP networks or wireless networks are more or less reliable than traditional copper networks. Like the proverbial "how high is up," this question needs some kind of referent. Traditional copper POTS networks are self-powered, and, because we have regulated them with an eye to reliability, have state and federal obligations to report outages, effect repairs in a reasonable period of time, and provide some quality of service guarantees. Proponents of greater reliability for wireless and IP-based networks point to the resistance of these media to flooding and corrosion.

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[15] California Public Utility Commission (CPUC), *Order Instituting Investigation Into Unauthorized Disclosure of Unlisted Numbers By Comcast* (adopted October 8, 2013) available at http://docs.cpuc.ca.gov/SearchRes.aspx?DocFormat=ALL&DocID=78432340 (last visited October 20, 2013); CPUC Staff Report, Safety Enforcement Division, *Investigation of Comcast Phone LLC and Related Entities Concerning the Unauthorized Disclosure and Publication of Unlisted Phone Numbers* (released September 25, 2013) ("CPUC Staff Report") available at http://docs.cpuc.ca.gov/SearchRes.aspx?DocFormat=ALL&DocID=78432340 (last visited October 20, 2013).

[16] CPUC Staff Report at 13-20.

My purpose here is not to enter into a debate about back up power or other forms of reliability. I will simply note in passing that resolving what requirements we should have for new networks now that they have matured from new entrants to critical infrastructure is one of many questions we must resolve as part of the transition. Given the importance of communications infrastructure to our lives, particularly in an emergency, we will hopefully continue to maintain reliability as a core value and acknowledge that government at all levels have both a keen interest in the safety of their citizens and an important role in ensuring that safety.

Rather, I wish to highlight here that the rise of new IP-based networks creates a new set of security issues that threaten the overall reliability of the network. In addition, the transition itself has created additional instability as assumptions built into TDM networks no longer hold true.

I refer to the problems of stability emerging as we transition to IP-based networks as "network neuropathy." The word "neuropathy" is a medical term referring to the breakdown of the central nervous system due to certain disease, which causes effects first in the extremities. Victims of neuropathy experience feelings of "pins and needles" in their extremities similar to when a hand or foot falls asleep, or may experience a decline in sensitivity. But while the sufferer experiences these things as happening at the extremities, the real problem lies in the core of the central nervous system.

We are experiencing a similar problem with our telephone network and the symptoms are rural call completion, caller I.D. spoofing, and other problems associated with the rise of IP networks. If we ignore these problems because they seem minor and peripheral today, we will find them attacking us with crippling force in the future.

Case Study: Rural Call Completion

Rural call completion occurs when calls originate in IP networks and are routed to rural TDM-based systems.[17] Using IP enables providers to employ third party "least cost routers" to minimize the cost of transporting traffic. This normally useful function of minimizing cost creates problems with rural exchanges as providers employ multiple routes to arbitrage intercarrier compensation (ICC) rates. This extended routing introduces latency which the target rural TDM system interprets as "dead air." Incoming calls are dropped, or may never get completed.

Any system that regulates only on the basis of market power or consumer fraud cannot address rural call completion. There is no "bad guy" trying to use market power to force rural exchanges out of business or to pay some sort of monopoly rent to transmit the call. Nor is the

[17] *See* Harold Feld, "If the Phone Doesn't Ring, It's Rural America," Daily Yonder (March 28, 2013) available at: http://www.dailyyonder.com/if-phone-doesnt-ring/2013/03/22/5733 (last visited October 20, 2013); Harold Feld, "Rural Call Completion and Network Neuropathy," Public Knowledge Blog (April 3, 2013) available at http://publicknowledge.org/blog/rural-phone-calls-and-network-neuropathy (last visited October 20, 2013).

carrier from whom the call originates engaged in an unfair practice. The problem comes from the natural market dynamic of carriers using new technology to save money.

Nor do "incentives" fix the problem. Larger urban carriers do not lose customers due to rural call completion problems – at least not in sufficient numbers to make the additional expense of direct routing worthwhile. It is often said carriers have no incentive to give bad service. But the real question is whether carriers have adequate incentive to give good service.

Those unwilling to concede that the IP transition raises problems that only government oversight can solve are quick to point out that it is artificially high ICC rates that drive carriers to use least cost routing in the first place. This is true, but not terribly relevant. The FCC has already announced a plan to eliminate ICC altogether and shift to "bill and keep." That has not solved the rural call completion problem.

If we insist that the FCC has no role in the IP transition except ongoing elimination of its "legacy regulation," then we have two choices for dealing with rural call completion. We can immediately eliminate ICC, with the resultant disastrous impact on rural carriers from the sudden elimination of revenue. Or we can tell rural America to wait several years and hope the problem clears up.[18]

Alternatively, we can embrace the idea that the FCC still has a role to play in maintaining a stable phone system and that a rush to eliminate its power to ensure that calls originating on one network terminate on another are premature.

The other problem with the "ICC is the root of all evil" approach to rural call completion is that it assumes that no such problem could ever happen again. This seems wildly optimistic. No one anticipated rural call completion would become an issue in the transition. It seems very likely that other unanticipated problems will arise, and we will want the FCC to address them.

Case Study: Caller I.D. Spoofing, SWAT-ing, and DDOS.

The transition to IP brings not merely the efficiencies and capacities of IP networks, but also their vulnerabilities. This is not a case of "better" or "worse" than traditional POTS networks. But rather we need to recognize that the new world of IP networks lacks many of the safety features developed in traditional TDM networks and opens a new set of vulnerabilities. If voice is simply "another application" on the IP network, then we import into the phone network the same vulnerabilities that plague us on the cybersecurity side.[19]

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[18] A bipartisan coalition of U.S. Senators has urged the FCC to act expeditiously to resolve the rural call completion problem. S. Res. 157, 113th Congress. For some, at least, waiting for ICC to zero out does not seem the preferable option.

[19] *See* "Reply Comments of Shockey Consulting," Docket Nos. 07-243, 95-116, 01-92, 10-90, 99-200, 13-5 (filed July 19, 2013) available at: http://publicknowledge.org/files/FCC_Shockey_Consulting_Reply_Comments_Numbering.pdf; *See also* John Bergmayer, "What We Mean When We Say 'Things Should Work' After the

Like viruses attacking a host with no defenses, these cybersecurity threats can invade our phone system with greater ease and have far more devastating effect. For example, dedicated denial of service attacks (DDOS) against voice-over-IP routers can take down phone systems and prevent emergency communications. Because the phone system includes TDM elements and IP elements designed to work together, under an assumption of stability, an attack that takes down one segment of the network can have far-reaching impact.

Additionally, we now have vulnerabilities associated with the misuse of phone numbers that simply did not exist previously. In the old world, only certified carriers meeting state and federal standards had access to phone numbers. We could trace a phone number easily through a chain of allocations and know who was using the number.

That is simply not true today. Many states have eliminated any certification for IP based carriers. CLECs and ILECS swap numbers freely, and provide them to other entities with no oversight. Worse, the shift to digital makes it easier for unscrupulous hackers to trick the system into treating fake phone numbers as real. While these vulnerabilities existed to some degree in the POTS network (as those of us old enough to remember "phone phreaks" will recall), the shift to digital creates new opportunities for bad behavior, while the steady stream of deregulation at the state and federal level of IP-based services translates into less oversight and more opportunities for mischief.

Caller I.D. spoofing goes beyond camouflaging the origin of unwanted calls. Bad actors can use fake caller I.D. information to frustrate law enforcement. The public safety community even has a name for the problem of "SWATing," the use of fake caller I.D. information to 9-1-1 to send a SWAT team to someone's home.[20]

In the absence of an FCC or state commissions empowered to address these issues, we can expect the Department of Justice and DHS to take lead in addressing these concerns. With all due respect to the law enforcement agencies, the solutions these agencies typically seek in the first instance raise serious concerns as to cost and effectiveness. Quite often they raise civil liberties concerns as well.

There is a reason Congress made the FCC the ultimate decisionmaker in CALEA, rather than the Department of Justice. But if we eliminate any role for the FCC in the IP Transition, we can depend on DoJ and DHS asserting their own authority to address these emerging issues of cybersecurity in the voice network.

PSTN Transition," Public Knowledge Blog (October 4, 2013) available at http://www.publicknowledge.org/blog/things-should-still-work (last visited October 21, 13).

[20] *See* Neal Ungerleider, "SWATing, A Prank Where Police Storm Your House," Fast Company (March 18, 2013) available at http://www.fastcompany.com/3007161/code-war/swating-prank-where-police-storm-your-house (last visited October 21, 2013).

The "Market" v. Real People

If this list of issues does not dent the confidence of techno-utopians that nothing can go wrong with the IP transition and the only role for government is to get out of the way, consider the recent experience of Verizon on Fire Island.

Following Superstorm Sandy, Verizon faced a choice on Fire Island: rebuild its copper network, deploy FIOS, or deploy its fixed wireless product called Voice Link. Verizon made the rational business decision that deploying either a copper or fiber network for the Island's small permanent population was simply not cost effective. Instead, they announced they would deploy Voice Link – a technology that allows the phones in your house to use Verizon's wireless network.

Verizon justified its choice using exactly the same talking points for eliminating any government oversight in the IP transition: "The market has embraced wireless, and has been moving away from traditional copper." In addition to the usual observations that about 40% of phone subscribers have dropped any form of landline service, Verizon also noted that 80% of the voice traffic from Fire Island was already wireless and the Verizon's wireless network is the most popular wireless network in the country – routinely receiving accolades for its quality and reliability.[21] What could possibly go wrong?

As even Verizon eventually conceded, Fire Island customers did not agree. Customer complaints and negative news stories, combined with regulatory scrutiny from the New York Public Service Commission (NYPSC) and the FCC, ultimately forced Verizon to commit to deploying FIOS on Fire Island.[22] Verizon experienced a similar customer rejection of forced migration from POTS to Voice Link in Mantoloking, NJ. Of the 600 customers Verizon previously had in this small beach community, only 120 have subscribed to Voice Link. The rest opted to keep a landline and subscribed to Comcast voice service.[23]

Verizon's experience on Fire Island illustrates the importance difference between *the market* and *actual real life customers.* Consumers like choices, and make comparisons and tradeoffs among different products. They do not like having their lives and expectations upended by large corporations telling them that a new technology is what they really need and that "the market" has spoken.

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[21] *See, e.g.,* Tom Maguire, "Setting the Record Straight on Fire Island and Voice Link," Verizon Public Policy Blog, July 11, 2013. Available at http://publicpolicy.verizon.com/blog/entry/setting-the-record-straight-on-fire-island-and-voice-link (last visited October 21, 2013).

[22] *See, e.g.,* Tom Maguire, "A Fiber Optic Network For Fire Island," Verizon Public Policy Blog, September 11, 2013. Available at http://publicpolicy.verizon.com/blog/entry/a-fiber-optic-network-for-fire-island (last visited October 21, 2013).

[23] *See* Ed Wyatt, "On A New Jersey Islet, Twilight of the Landline," New York Times, October 14, 2013. Available at http://www.nytimes.com/2013/10/15/technology/on-a-new-jersey-islet-twilight-of-the-landline.html?_r=0 (last visited October 21, 2013).

In particular, consumers do not like suddenly discovering that technologies on which they rely will no longer work, or that services they are accustomed to receiving are no longer available. We in Washington D.C. may think faxes are an obsolete technology or that no one cares about their choice of long-distance provider or international calling plan. But many real people – especially the 100 million people who have elected to stay with traditional copper lines – do care.

If we want to repeat the failure of Fire Island, we should by all means trust 'the market' and ignore the actual people on the ground. If we would like better consumer acceptance, we need to focus on real community needs rather than aggregated national statistics. While we will undoubtedly need to phase out TDM over time, I can think of no surer recipe for disaster and consumer backlash than to simply convert wire centers to IP with the admonition to outraged customers that the conversion is what they really need because 'the market' has spoken.

We Are Vastly Under-Estimating The Impacts On Small Businesses and Government

So far, we have not considered the impacts of the IP transition on small businesses. Nor have we considered the impact on local, state and federal government agencies. But these two sectors are among the most dependent on the consistent and reliable operation of the telephone system. In addition, these sectors have significant amount of legacy equipment designed for traditional telephone service.

The Fire Island experience highlights the potential problems small businesses may face during the transition. Fire Island businesses experienced significant problems with loss of fax machine service. Credit card processing became unreliable. ATM transactions likewise became unreliable. Alarm systems dependent on existing copper lines also did not work. In addition, voice quality in some cases was so poor, and calls dropped so frequently, that businesses complained of an inability to conduct ordinary business.

While Fire Island was a wireline-to-wireless conversion, the same problems can occur with TDM-to-IP wireline conversions. Small businesses given insufficient warning of the conversion of their local wire center may find their business disrupted and may incur unanticipated expenses to buy new equipment or alarm services compatible with new technologies.

In the current market, small businesses converting from TDM-to-IP do so *voluntarily*, generally with the assistance of a sales agent eager to ensure that the transition goes smoothly. Even then, part of every business' decision to embrace or not embrace IP-based technology includes factoring in possible disruption from the transition and expenses associated with replacing legacy equipment and services.

Converting an entire wire center, and thus forcibly converting all small businesses that have elected to remain on copper-TDM, is an entirely different matter. To assume that the experience of forcibly migrating businesses will resemble the voluntary migration of businesses to date blinks at reality – especially if done without sufficient warning or outreach to the local community.

The same concerns apply to government agencies as well. Government at all levels requires thorough planning and budgeting for expenses. If, for example, HHS must replace all existing fax machines in its field offices and headquarters and replace them with new IP compatible models, it will need sufficient planning time (and additional appropriation of funds) to ensure that critical government services are not disrupted.

State and local governments are even less likely to be prepared for the transition than federal agencies. But no one has put forth any plans for coordinated outreach or education vital to a smooth and successful transition.

What We Need For A Successful Transition

The above list does not even begin to capture the scope and complexity of shifting one-third of our nation from traditional copper lines to IP-based services. While we have had technological transitions of the telephone network before, we have managed them in a far more controlled environment. While no one would want to return to the days of "Ma Bell" and regulated monopoly, we must acknowledge that the diversity of our current communications system creates far greater challenges of coordination and integration than previous telephone network upgrades.

Furthermore, previous upgrades involved years of planning and gradual phase in of technology in a stable regulatory environment. No one imagined that the phase out of party lines, or the upgrade to SS7, required the complete phase out of nearly all state and federal oversight of the telephone system. It seems reckless in the extreme to imagine that nothing could improve a horribly complex and critical technical transition like the sudden elimination of all established safeguards and practices, coupled with elimination of any authority to fix things if they go wrong. Yet that is precisely what an endless stream of reports and white papers appears to propose as the most "sensible" thing to "speed the transition."

The real work of planning the transition has been further hampered by the effort to cast this as being "for" or "against" the transition or – even worse – "for" or "against" AT&T. While we should expect healthy debate around specific proposals, efforts to make the transition about industry wish lists for deregulation or preservation of this or that specific regulation do more than miss the point, they actively interfere with what needs to happen to keep this transition running smoothly.

The Central Role of the FCC

Rural call completion provides the perfect example why eliminating FCC authority prematurely can sabotage the IP Transition. Any short term solution to the rural call completion problem requires invocation of FCC Title II authority over IP-based services. This is the heart of interconnection and the core of Title II, requiring that one network complete calls from another network. If we had followed the path of those who see this first and foremost as an opportunity for regulatory relief, we would now be helpless to resolve this issue.

Talk of massive restructuring of the FCC or limitations on its authority to address potential problems, is not merely premature – it is counterproductive. Such suggestions divert attention from critical work that remains. It causes parties to retreat to their respective bunkers and entrenched positions at precisely the time we should be cooperating with each other to ensure a smooth transition.

Let us be clear, the measure of success for this transition is not *how many regulations did you kill,* but *did you avoid crashing the phone system and/or enraging your customers?*

For the same reason, we should reject the efforts of parties like the 21st Century Privacy Coalition to rip the heart out of the FCC's consumer protection jurisdiction and transfer it to the Federal Trade Commission.[24] Even were we not in the middle of a complex transition, such a move would be profoundly anti-consumer and utterly unwarranted. Americans do not want their personal telephone calls to have the same lack of privacy protections as their Facebook status.

But from a practical perspective, I can think of no better way to cause chaos in this transition than to take a critical aspect of the FCC's consumer protection regulation and transfer it to another agency with no history or experience in regulating phone service. At best, coordination across two agencies on vital consumer protections would hinder the transition and create confusion among carriers and consumers as to their rights and responsibilities.

None of this is to suggest that the Federal Trade Commission does not play an important role in protecting consumers. Rather, since 1934, we have recognized that management of the critical infrastructure of our communications system requires a single agency. Other agencies, such as NTIA and NIST, will certainly play supporting roles in the PSTN Transition. But the FCC must serve as the central coordinating agency to ensure that the pieces of this transition work together, rather than work against each other.

Guidance For Natural Disasters

As a first step in the transition, the Commission should ensure that carriers and consumers know what to expect in the wake of natural disasters that destroy communications infrastructure. As we saw in the wake of Hurricane Sandy, carriers may face difficult choices as

[24] *See* Cecilia Kang, "Here's How The Telecom Industry Plans To Defang Their Regulator," Washington Post (September 12, 2013) available at: http://www.washingtonpost.com/blogs/the-switch/wp/2013/09/12/heres-how-the-telecom-industry-plans-to-defang-their-regulators/ (last visited October 21, 2013).

to whether to replace damage networks with new technologies. At the same time, consumers rebuilding their lives in the wake of a natural disaster need certainty that they will have access to reliable phone service.

Public Knowledge, joined by 17 other public interest organizations, submitted a letter to Acting FCC Chairwoman Mignon Clyburn requesting the FCC commence a separate proceeding to provide guidance to carriers on their responsibilities when a disaster destroys their network and the carrier wants to replace the network with an IP-based or wireless technology. We hope that the FCC will move expeditiously on this request.

In times of crisis, the obligations and expectations of all parties must be clear. The FCC can take appropriate action, while reserving judgment on the final outcome for policy decisions following the transition.

We Need Real Trials and Real Planning, Not Industry Wish Lists

As Public Knowledge has repeatedly stated, we favor well-structured technical trials to inform the FCC on appropriate policy. We are therefore considerably disappointed at the game playing by AT&T on the one hand to politicize the test process. On the other hand, we are equally frustrated with the competitive carrier community for its stubborn insistence that we have no need of trials at all.[25]

First, AT&T has repeatedly criticized the FCC for failure to 'move forward' on its 'application.' This is, bluntly, utter nonsense. AT&T has not submitted a serious application. If this were an NSF Grant Proposal, AT&T's 'proposal' would boil down to "give me a billion dollars and I will do some cool stuff." When asked to elaborate, AT&T's reply boils down to "don't bother me with all that reporting stuff or safety precautions because you can't rush genius."

No one would accuse NSF of "hating science" or standing in the way of progress for treating such a proposal as nothing more than an attempt to get free money. AT&T's proposed "trials" deserve a similar rebuke. In Public Knowledge's reply comments to the FCC's public notice on possible trials, Public Knowledge identified numerous deficiencies that would need to be addressed before the FCC could even ***consider*** it a genuine proposal.[26] These deficiencies include:

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[25] *See generally* Harold Feld, "Our Bogus 'Debate' About PSTN Trials," Tales of the Sausage Factory (September 13, 2013) available at http://tales-of-the-sausage-factory.wetmachine.com/our-bogus-debate-about-pstn-trials/ (last visited October 21, 2013); Jodie Griffin, "What We Need To See In A Pilot Program," Public Knowledge Blog (August 26, 2013) available at http://publicknowledge.org/blog/what-we-need-see-pilot-program-proposal (last visited October 21, 2013).

[26] Reply Comments of Public Knowledge, Docket No. 13-5 (filed August 7, 2013) available at http://apps.fcc.gov/ecfs/document/view?id=7520936672 (last visited October 21, 2013).

- Failure by AT&T to describe adequate safety precautions – or any safety precautions whatsoever – in the event the trial jeopardizes 9-1-1 access, disrupts critical services, or otherwise places the well-being of subscribers at risk;

- Failure by AT&T to provide any metrics for the study, by which to gauge success or failure or provide any useful information to the general public;

- Failure by AT&T to provide any transparency or accountability mechanisms;

- Failure to specify any end point to the trial.

By contrast, AT&T had no difficulty specifying things it did want, largely preemption of any inconvenient rules, and the right to permanently transfer customers regardless of any failure of the new network or cost to the customer in the form of lost or degraded service or legacy equipment rendered inoperative.

Public Knowledge made its disappointment quite clear:

> "This is not just a case of recalcitrant customers who 'do not want change.' These are everyday Americans who have legitimate concerns that the network they count on to support services in what could be life-or-death situations will lose its reliability and functionality. Requiring the transition to be a true step forward, not a step backward, for everyone is not 'hold[ing] back progress,' it is *demanding* progress."[27]

It defies belief to accuse the FCC of some sort of dereliction of duty that it declined to grant AT&T's request to conduct live experiments with its customers with no safety precautions. To the contrary, the FCC would have been derelict in its duty to protect the public if it had ***granted*** this absurd request. How could the FCC possibly approve a request that could easily result in customers losing 9-1-1 access, potentially cause small businesses to lose access to their customers, and possibly leave state and federal government agencies in the trial area unable to provide critical services – with no oversight of any kind?

In January, AT&T accidentally shut off tens of thousands of U-Verse customers for several days.[28] In light of this, it does not seem unreasonable to demand that AT&T set out some kind of safeguards for what happens if things go wrong. Those who would scold the FCC for undue caution should ask themselves, "Would you like to participate in a forced migration similar to the experience on Fire Island, where you could lose access to 9-1-1 or critical services? Wouldn't you like some kind of oversight and back up plan, just in case?"

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[27] *Id.* at 5.

[28] Dara Kerr, "AT&T's U-Verse Blacks Out For Days in Several States," CNET (January 23, 2013) available at http://news.cnet.com/8301-1023_3-57565559-93/at-ts-u-verse-blacks-out-for-days-in-several-u.s-states/ (last visited October 21, 2013).

Finally, there is simply no justification for demanding that AT&T be permitted to migrate customers permanently as part of a "trial." The insistence on permanently migrating customers as part of a supposed "technical trial" fuels the stubborn resistance of nearly every other telecommunications provider to what would be – if properly structured and with suitable safety mechanisms – be a valuable contribution to the nation's IP Transition.

At the same time, the Fire Island experience demonstrates that we do not know nearly enough about what happens when we shut off the copper entirely. Our "transition" to date has all taken place in the context of customer conversions where the traditional copper safety net provides adequate protection for customers who discover that IP services do not meet their needs.

Instead of genuinely engaging with the effort to construct trials, competitive providers and cable operators have responded with their own wish list to counter AT&T's wish list. Not surprisingly, the greatest concern for CLECs and cable VOIP providers lies with interconnection. AT&T submits its wish list to be free of interconnection obligations entirely, while other providers submit their wish list to have interconnection obligations entirely resolved before we even begin testing.

This transition is too important to be managed by industry wish lists. To be clear, while we support technical trials, Public Knowledge does not support 'behavioral experiments' such as seeing if AT&T can negotiate an IP Interconnection agreement without regulatory compulsion because this is hardly indicative of the real world. But that is a side point. The more important point is that the time has come for both AT&T and the competitive provider community to stop making this a battle of dueling wish lists and step up to their responsibilities as providers of critical infrastructure.

This Is Not AT&T's Transition; This Is The Transition Of The Phone System of the United States On Which 300 Million People Depend, And All Providers Have A Shared Responsibility To Make It Work.

Which brings me to a final point. Although AT&T deserves credit for beginning the dialog on this transition in a comprehensive way, this is not "AT&T's transition." This is not a negotiation with AT&T, or with ILECs generally, or between ILECs and CLECs. This is the transition of the phone system of the United States, and responsibility for its success or failure lies with *all* of us.

Every single carrier benefits from having a national phone network that reliably reaches everyone, everywhere, every day. In addition to this general benefit, carriers receive many explicit benefits such as poll attachment rights and access to the international phone numbering system. In exchange, all carriers have a collective responsibility to make sure the system continues to work in accordance with our fundamental values.

It is time for all carriers to stop advocating around their own narrow interests and acknowledge this collective responsibility. It is time to stop telling regulators what you want, without also offering solutions to the challenges of the IP Transition.

Most importantly, it is time to stop insisting that we sideline the people of the United States by stripping federal and state agencies of their power to protect the public and the public interest.

Conclusion

As every member on this Committee knows, for all that constituents have embraced of new means of communicating like email and Twitter, many of them still count on reaching their elected official by phone. As noted above, 96% of Americans still subscribe to some form of basic voice service, despite the fact that many of them embrace other communications technologies as well. If we want to see how attached the public remains to basic voice service, by all means let ignore the warning signs we have already seen and bull ahead with no plan and no goal beyond "elimination of legacy regulation."

Alternatively, we can take the steps to ensure that the transition works for all Americans. Guided by a framework rooted in the fundamental values that made our phone system the envy of the world, we can develop transition plans that will protect these values and preserve for all Americans affordable access to a reliable and ubiquitous network for the 21st century.

But a successful transition requires real work and a shared commitment from all of us. If we continue to make this a debate about deregulation and "legacy rules," rather than focus on the very real challenges before us, we can be certain that failure will follow.