

*IP Transition as Grand Challenge*  
**Remarks by former WCB Bureau Chief Sharon Gillett**  
**Voice Communication Exchange Workshop on the Transition to IP Networks**

Thank you Dan for that kind introduction. I'd also like to thank you for inviting me to speak at this event, and for framing today's topic so appropriately in terms of a **transition** as well as a **grand challenge**. So much of the rhetoric about this topic to date has implied that our nation's communications networks are somehow about to magically cease operations, and it's refreshing that the title of today's conference appropriately acknowledges that while certain technologies may be phasing out over time, our vital networks are not going away; rather, they are gradually transitioning into the IP-based platforms of the future. It's also appropriate to think of this transition as a grand challenge: it promises tremendous benefits to consumers and businesses across the country, and it will require a cooperative and concerted effort across many different disciplines, perspectives, and jurisdictions. Today I'm going to share with you some facts about the shape of the transition to date and my thoughts on where it might be headed; talk about some of the specific actions the FCC has already taken to further the IP transition; and discuss some of the challenging issues that remain, particularly in the areas of interconnection and ubiquitous service.

First, to the question of endpoints vs. transitions. There has been a lot of rhetoric floating around about how the "phone system" -- whatever *that* means -- is or should be ending. But these debates rarely define what is meant by the "phone system." To be sure, if the term is meant to refer only to landline, circuit-switched phone lines, then indeed that system is shrinking. The FCC counted 192 million such lines in 2001; by mid-2011, the number had declined by over 40%, to 112 million. However, I would argue that restricting the term "phone system" to circuit-switched landlines is an overly narrow interpretation that doesn't match my experience of how most consumers think. Telecom geeks like ourselves may understand whether our calls are circuit-switched or packet-switched, but in my experience the average consumer doesn't know the difference -- or care. It's a testable hypothesis, but in my observation, a consumer thinks he's using the phone system whenever he dials the customary 10 digits -- whether his calls travel over wires or radio spectrum, TDM or IP. Even deconstructing the more common geek-speak

term for the phone system – the Public Switched Telephone Network, or PSTN – leads us back to use of a system with three key attributes: it is public (meaning, anyone can use it), it is switched (meaning, anyone can call anyone else who is on it, based on a common addressing system, known to those of us in this room as E.164 numbering), and, finally, it is accessed via telephones (whether fixed or mobile). Nothing about the PSTN terminology restricts the phone system to circuit-switched landlines – notwithstanding the fact that the term developed during a period in history when that was the only technology available to consumers.

That period of history is now clearly over, and the phone system – broadly defined – is thriving. By the middle of 2011, the FCC counted nearly 34 million interconnected VoIP subscriptions in the U.S., a 55% increase since the agency's first count of iVoIP subscriptions in 2008. By June 2011, 31.6% of American homes had cut the cord and gone wireless-only, and our data showed over 290 million wireless subscribers nationwide. Furthermore, CTIA reported that in 2011, U.S. mobile phone users sent over 2.3 trillion text messages and spent a similar number of minutes making phone calls. So while the phone system is certainly changing in form, it is hardly disappearing.

That is why I think of what is happening today as a transition, not the imminent arrival of an endpoint. The phone system is not ending in the way that analog over-the-air TV broadcasting did, with the federal government shutting off access, on a date certain, to the underlying spectrum. Rather, I find it instructive to look at a different previous transition to get some sense of how this one might play out.

I see we have a lot of telecom experts in the room. Would any of you like to hazard a guess as to what year the first telegram was sent? It was 1844 when Samuel Morse sent the first telegram. He sent it from Washington, DC to Baltimore, Maryland, and it read: "What Hath God Wrought." Many of us tend to think of communications technologies as happening in overlapping waves, with only a small amount of overlap between the generations: first there was the telegraph, then the landline phone, then cell phones and the Internet. But do any of you know – or want to guess – when Western Union sent the last commercial telegram? In fact, it was not until 2006, 162 years after the first telegram was sent, and long after telegrams had fallen out of common use. If the

phone system follows the same long-tailed pattern, the last phone call won't be made until 2038, 162 years after 1876, the year of Bell's famous summons to Watson, (saying, "Mr. Watson, come here – I want to see you"). About the only thing we can be sure of at this point, however, is that the last phone call made will almost certainly interrupt us during dinner.

What is driving today's transitions in how we talk to each other over distance? Competition and innovation in the industry, and consumer enthusiasm for the myriad new services that have arisen as a result. But that's not to say that government hasn't had an important role. The whole transition to mobile services wouldn't have been possible if the FCC hadn't made the spectrum available for consumer uses, starting a couple of decades ago. To this day we're continuing to work tirelessly to make more spectrum available for voice and broadband services. In particular, staff at the FCC are now hard at work implementing the voluntary incentive auctions that Congress authorized in February's Middle Class Tax Relief and Job Creation Act.

Government also has a key role to play in protecting consumers, promoting competition and investment, and maintaining the safety of the American public as the transition unfolds. In a series of rulemakings and other proceedings since 2005, the Commission has extended many of the consumer protections of the historic phone system to newer interconnected VoIP offerings, ensuring that consumers are not unpleasantly surprised by phone service that doesn't meet their long-established expectations. For example, in 2005 we ensured that consumers using interconnected VoIP providers would be able to use E911. In 2006, we addressed the sustainability of universal service by bringing interconnected VoIP providers into the system as contributors. In 2007 and 2008, we extended protections for interconnected VoIP users in the areas of customer privacy, relay services for the deaf and hard-of-hearing, and phone number portability. In 2010, Congress passed the Twenty-First Century Communications and Video Accessibility Act, which required even non-interconnected VoIP providers to make their services accessible to people with disabilities and to contribute to the fund that supports relay services; last year, the Commission released orders implementing both requirements. Most recently, in February, the Commission extended its outage reporting rules to interconnected VoIP, so that it can monitor how well providers are meeting their

statutory obligation to provide 911 and E911 service to consumers. Moreover, when hurricanes, blizzards, earthquakes and other natural disasters strike, we can be more confident that we're getting an accurate picture of the scope and location of outages.

Government also plays an important role in fostering the transition by updating its rules, so that they do not inadvertently deter adoption of new technologies that provide efficiencies for industry and innovations for consumers. That principle was fundamental to the comprehensive overhaul of the universal service and intercarrier compensation systems that the Commission adopted last October. Intercarrier compensation refers to the somewhat byzantine system of payments that evolved in the wake of the Bell system divestiture and through which carriers pay each other – on a per-minute basis – for the origination, transport and termination of phone calls. Three aspects of this reform were squarely aimed at facilitating the transition to IP networks. First, the reform phases down many per-minute charges and replaces them with a predictable, though still declining, access recovery universal service fund, so that local exchange carriers will become less dependent over time on the minutes of circuit-switched phone calls that are rapidly disappearing. Second, prior to the Order, the intercarrier compensation obligations that pertained to VoIP traffic were the subject of much dispute. To minimize investment uncertainty, the reform adopted a clear prospective framework for intercarrier compensation for VoIP traffic. Finally, the Order made clear the Commission's expectation that "carriers will negotiate in good faith in response to requests for IP-to-IP interconnection for the exchange of voice traffic" -- arrangements that many have argued will be critical to protecting and promoting competition as circuit-switching equipment is retired and replaced with VoIP technology.

I'll say more about interconnection in a bit, but first a word about competition, which Congress charged the FCC with promoting in the Telecommunications Act of 1996. We keep this directive in mind in all of our work, including with the IP transition. Earlier this month, the Chairman circulated an order that lays out a path to reform and modernize the Commission's rules for special access services to help promote competition in broadband markets and to eliminate unnecessary regulation where competition has flourished. For those of you not steeped in the details, special access circuits are dedicated, high-capacity connections that are mostly sold by incumbent

providers and are used by businesses, other institutional users, and competitive providers to directly connect customer locations to each other and to wide-area networks. Known as DS-1's and DS-3's – respectively, 1.5 and 45 Mbps of guaranteed, symmetrical bandwidth - these connections are a key element of fixed and mobile broadband and voice services, for both businesses and consumers, and they play a critical role in our economy. Mobile providers use special access connections to link cell towers to wireline backbone networks. Enterprise customers across the country rely on special access connections – directly or indirectly - to conduct their businesses. And schools, libraries, and other institutions of state and local government depend on special access connections to provide services to their constituents. All of this amounts to robust demand for special access services – in fact, four of the largest ILECs recently reported that their combined 2010 revenues from sales of DS-1s and DS-3s exceeded twelve billion dollars.

The order sets out a path to reform of the Commission's rules for special access, which increasingly appear ill suited to the competitive landscape that exists today. This is a point, by the way, on which virtually all stakeholders agree, as noted in a recent *ex parte* filing at the FCC which stated that "the ineffectiveness of the triggers is one area where purchasers of special access and ILECs agree." For one, the current rules assume that competitive conditions are likely to be similar across large geographic areas that encompass both dense urban centers and rural areas. The data we have from the operation of our rules since 1999 and two data requests over the past two years call this assumption into question. At the same time, the current competitive showing framework almost completely fails to account for cable competition, which appears to be a significantly growing force in today's business markets. Accordingly, the Order lays out a path towards data gathering and market analysis to determine more accurately the areas where deregulation is appropriate. The specific data request will follow in a subsequent order. As this process is ongoing, the order on circulation would temporarily suspend consideration of new petitions under our rules to preserve the status quo. And, to be clear, the Order maintains the current status for incumbent providers of special access services – it does not roll back existing grants of pricing flexibility.

What's the connection to the IP transition? As with consumer voice service, dedicated connections are transitioning to IP-based services, primarily in the form of

packet-switched Ethernet connections. In 2007, the Commission encouraged this transition by granting forbearance from dominant carrier regulation of certain packet-switched or optical transmission services in response to petitions from several large carriers. These carriers now have the flexibility to offer unregulated Ethernet and fiber-optic transmission services, transitioning at whatever pace they choose. DS-1's and DS-3's remain highly relevant, however. For example, one large competitive carrier told us that they purchase 160 times more DS-x circuits than Ethernet connections at this time. Businesses and carriers still use DS-1s and DS-3s because these products either are appropriate for their needs, or are the only available option. And the availability of special access circuits is often critical to robust competition in the provision of newer IP services that integrate far-flung operations, for example between an insurance company's big-city headquarters and its thousands of small-town agents. The transition is clearly not over yet.

Over the last year, we've also heard from many parties about the importance of effective competition policy with regard to burgeoning IP-to-IP interconnection issues. An interconnected phone network has been central to our nation's communications policy since before the FCC even existed, going at least as far back as the Kingsbury Commitment. As Milton Mueller explained in his book on universal service, that term, as used by Theodore Vail, originally referred to a fully *interconnected* network – one in which anyone could call anyone else without having to have more than one phone. We can all agree that interconnection is critical in light of the role of network effects – yet, there are conflicting views regarding interconnection requirements in an IP-centric world. This issue highlights the kind of technical, legal, economic and policy questions that we need to consider as we take concepts from the context of a network that was designed and built to provide phone service—the PSTN-- and consider whether and how to transfer them into the context of networks built from new technologies and designed to support many apps, of which voice is only one.

As many of you may know, last year's USF/ICC Transformation Order contained a Further Notice on IP-to-IP interconnection issues. Some of the questions that we are thinking about include:

- What is technically possible, and what is technically feasible on an industry-wide scale?
- How do we work out efficient and equitable solutions to difficult issues like the number of points of interconnection, and costs to convert from TDM to IP, and what solutions have industry players negotiated on these issues to date?
- What is the appropriate role and authority for the Commission regarding the interconnection of IP-based networks without an intervening TDM conversion, in particular for the exchange of phone calls?

We are actively evaluating these questions and reviewing the record received to date from industry and other stakeholders. The commission has also tasked the Technological Advisory Council (TAC), comprised of outside technical experts, to provide advice and recommendations regarding the transition. TAC Working Groups are taking a look at some of the pressing technical issues in this space, including questions such as:

- How is industry dealing with the exchange of traffic between IP and legacy circuit-switched networks, and how will those methods change as the network shifts to an all-IP network?
- How might interconnection requirements and provisioning evolve as consumers adopt new communications technologies, such as HD voice or video?
- Do technological interconnection issues exist at higher protocol levels, e.g., SIP?
- What architectures might evolve to support VoIP interconnection and interconnection of advanced communications services? How would architectures function at different network layers, such as MPLS, IP, or SIP?

If interconnection policy is one important dimension of universal service, then ubiquity, of course, is the other. The near-ubiquitous reach of the landline phone network stands as one of the great American public policy achievements of the 20<sup>th</sup> century. Achieving ubiquity in the 21<sup>st</sup> is an enormous challenge for both federal and state policy makers, who have had an historic partnership in achieving universal service. The

Commission has embraced this challenge with gusto, adopting 3 unanimous modernization orders since 2010 to comprehensively reform the universal service programs that ensure affordable communications for rural areas, low-income consumers, and schools and libraries.

A pillar of all these reforms has been to recognize the importance of broadband and mobile services, in addition to traditional voice service. Last fall, in reforming the program that supports communications in rural areas, we established a Connect America Fund with the explicit goals of achieving ubiquitous fixed *and* mobile networks that offer both voice *and* broadband services. We envision a transition in which, ultimately, voice service is offered over broadband-capable networks, whether fixed or mobile. To get there, last fall's order adopted a number of policy innovations, including the targeting of universal service support towards areas not already served by unsubsidized competitors, and the use of reverse auctions to award support for mobile service in areas that are otherwise uneconomic to serve. The application window for our first auction, known as Mobility Fund I, opens on June 27, and the auction itself is scheduled for September 27. In addition, on April 25, we offered up to 300 million dollars in incremental funding to price cap carriers to encourage near-term deployment of fixed broadband to hundreds of thousands of unserved rural locations.

But federal universal service funding is only one piece of the shared federal-state commitment to a ubiquitous phone system. Two others are state universal service funds and state Carrier of Last Resort, or COLR, obligations. Traditionally, states (not the FCC) have established COLR obligations for incumbent local exchange carriers. These obligations require the incumbent LEC to provide phone service to anyone within the carrier's service area who requests it. Carriers are typically allowed to charge customers for any associated construction costs, and in many cases they receive explicit funding from a state or the federal universal service fund. In addition, COLR providers may receive access to rights of way and are typically certificated to provide service. A carrier of last resort must also generally receive state approval before that carrier may exit the market. As far as we know, all incumbent LECs who remain subject to COLR duties are also designated as Eligible Telecommunications Carriers, or ETCs – a term of art defined

by section 214 of the Communications Act that essentially translates to “carriers that have qualified to receive federal universal service support.”

State COLR obligations have been fundamental to the accomplishment of universal phone service. In the record that led to the Connect America Fund order, some suggested that the FCC should pre-empt state COLR obligations. We rejected that suggestion because we recognized the historic role that states have played in ensuring consumers retain phone service.

Transitioning COLR obligations along with the phone system does raise a number of important questions, and states have been wrestling with those issues. One principle that in our view is *not* up for debate: every American should have access to reliable, affordable phone service. But in a world where phone service is provided by a variety of different companies using an array of diverse technologies, a number of questions arise:

- Who should be subject to COLR duties, and what should those obligations entail?
- What technologies can fulfill COLR functions?
- What is the appropriate role for state and federal governments?
- Who should pay – consumers, providers, or state or federal universal service funds?
- How should competitive concerns about the need for level regulatory playing fields be addressed, given the dramatic changes I highlighted earlier regarding the types of phone service that consumers are now buying?

We’ve been monitoring how state legislatures have been grappling with this thicket of issues in recent years. For example, earlier this year, Indiana passed legislation that allows a provider of last resort to be relieved of its obligations as long as there are at least two telecommunications providers that are *eligible* to become ETCs and are offering voice service through any technology or medium. In Alabama, legislation signed by the Governor in April expands the definition of local telephone service to include any technology, and relieves incumbent LECs from obligations to provide basic telephone service unless they choose to retain that obligation and file notice with the Public Service Commission. And, a Wisconsin bill passed last year allows ILECs to meet COLR

obligations through any technology (for example, wireless) or any affiliate, and relieves ILECs of COLR obligations if the Wisconsin Commission finds it in the public interest or if it finds that effective competition exists for voice service.

In thinking about how these state laws will play out, it's worth reiterating what we believe is a common goal – ensuring that everyone continues to have access to voice service. Recent state laws represent federalism in action, with the states serving as test-beds for different ways to update COLR obligations consistent with a transitioning phone system and the preservation of universal service. We'll be watching the outcomes of these state actions closely.

I mentioned earlier that incumbent LECs with COLR duties are typically also designated as Eligible Telecommunications Carriers, or ETCs, and receive federal universal service funds. Just as states are updating COLR duties to reflect a changing world, the Commission has also sought comment on the duties of an ETC. In section 214(e)(1) of the Act, Congress directed that ETCs shall offer services “*throughout* [their] service area.” In a Further Notice accompanying the recent Connect America Fund order, we asked for input on how to interpret the obligation to provide service throughout a funded carrier's service area, and if there are circumstances in which service area redefinition or selective forbearance could be appropriate, given the more targeted funding mechanisms adopted as part of the Connect America Fund. In considering these questions, we are mindful of the various expressions in section 214 of Congress' ongoing expectation of universal service. For example, in section 214(e)(4), which sets forth provisions for relinquishment of ETC designation, Congress made clear that relinquishment could only be accomplished in such a way that “all customers served by the relinquishing carrier will continue to be served.” We must keep this Congressional charge in mind as the phone system continues to evolve, and not lose sight of the basic obligation to ensure that a phone system in transition still provides consumers with ubiquitous and reliable phone service.

As you can see, we have no shortage of grand policy challenges to solve as the phone system transitions to a new world. Helping to foster the transition while continuing to protect consumers and promote competition and investment is a challenge

the FCC has embraced. Thank you for giving me the chance to tell you about our efforts today, and I look forward to your questions.

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