COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF TELECOMMUNICATIONS AND CABLE

Investigation by the Department on its Own Motion to Determine whether an Agreement entered into by Verizon New England Inc., d/b/a Verizon Massachusetts is an Interconnection Agreement under 47 U.S.C. § 251 Requiring the Agreement to be filed with the Department for Approval in Accordance with 47 U.S.C. § 252	)	D.T.C. 13-6

DIRECT TESTIMONY OF

EUGENE J. SPINELLI, SHERRI D. SCHLABS AND PAUL B. VASINGTON

ON BEHALF OF VERIZON NEW ENGLAND INC.

January 15, 2014

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I. INTRODUCTION AND SUMMARY

Q. MR. SPINELLI, PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.

A. My name is Gene J. Spinelli. My business address is 500 Summit Lake Drive, Valhalla, New York 10595. I am Manager - Product Technology for Verizon. In that role, I manage the group responsible for architecture development, design and deployment of Verizon's Global SIP Carrier Interconnect Platform, which provides the capabilities that Verizon employs to interconnect with other service providers for the exchange of session based voice and data communications traffic in Internet Protocol (IP).

Q. MR. SPINELLI, PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.

A. I have a Bachelor of Electrical Engineering Degree from Manhattan College in Riverdale, New York, and a Master of Business Administration degree in International Business from Pace University in White Plains, New York. I have been employed by Verizon and its predecessor companies for 29 years and held various positions in Marketing, International Relations, Carrier Management, Network Planning and, for the past five years, Product Development.

Q. MS. SCHLABS, PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.

A. My name is Sherri D. Schlabs. My business address is 600 Hidden Ridge, Irving, Texas 75038. I am Acting Director – Global Wholesale Interconnection Services for Verizon.

In that role, I manage the group that negotiates and manages wholesale agreements with other service providers, including commercial agreements for the exchange of voice traffic in IP.

Q. MS. SCHLABS, PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.

A. I have a Master of Business Administration degree in Marketing from the University of Texas at Arlington and a Bachelor of Business Administration degree from Angelo State University. I am a certified Project Management Professional. I have been employed by Verizon and its predecessor companies for 29 years and have more than 19 years of experience in developing policy, negotiating terms, and managing implementation of interconnection services, including IP interconnection for Voice over Internet Protocol (VoIP).

Q. MR. VASINGTON, PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.

A. My name is Paul B. Vasington. I am Director – State Public Policy for Verizon. My business address is 125 High Street, Boston, Massachusetts 02110.

Q. MR. VASINGTON, PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.

A. I have a Bachelor of Arts degree in Political Science from Boston College and a Master's degree in Public Policy from Harvard University, Kennedy School of Government. I have been employed by Verizon since February 2005. From September 2003 to February 2005, I was a Vice President at Analysis Group, Inc. Before that, I was Chairman of the

Massachusetts Department of Telecommunications and Energy ("MDTE") from May 2002 to August 2003, and was a Commissioner at the MDTE from March 1998 to May 2002. Before my term as a Commissioner, I was a Senior Analyst at National Economic Research Associates, Inc. from August 1996 to March 1998. Before that, I was in the Telecommunications Division of the MDTE (then called the Department of Public Utilities), first as a staff analyst from May 1991 to December 1992, then as division director from December 1992 to July 1996.

Q. WHAT IS THE ISSUE IN THIS PROCEEDING?

A. Verizon negotiated and entered into commercial agreements with Comcast regarding the exchange of voice traffic in IP format. We understand that the Department is investigating whether any of those agreements must be filed for Department approval in accordance with § 252 of the federal Communications Act.

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. Requiring companies like Verizon and Comcast to file IP VoIP interconnection agreements for approval as § 252 interconnection agreements would impede the transition that customers are driving from older circuit-switched Time Division Multiplexing ("TDM")-based services to newer IP-based services like VoIP.

Every day, more and more customers are choosing innovative VoIP services like Verizon's FiOS Digital Voice. We explain the nature of FiOS Digital Voice. We explain generally how companies interconnect today to exchange VoIP traffic and how VoIP has flourished through those arrangements. We then discuss the agreements between Verizon

and Comcast, and we explain how Verizon and Comcast exchange VoIP traffic in IP in accordance with those agreements.

Verizon agreed to negotiate a commercial agreement to interconnect in IP format and exchange VoIP traffic with Comcast, and we explain that Verizon and other VoIP providers have existing incentives to enter into similar agreements. Verizon has made clear that it will negotiate IP VoIP interconnection in good faith – and that providers that are serious about IP interconnection for VoIP can reach commercial agreements on reasonable terms.

It is the right public policy to continue to allow service providers to establish IP interconnection for VoIP through negotiated commercial agreements. As more and more customers switch to VoIP service, the greater efficiency of exchanging voice traffic in IP format provides VoIP providers ample incentive to negotiate commercial agreements and interconnect their networks in IP format. Freedom to negotiate commercial agreements will result in an efficient system of IP interconnection for VoIP traffic.

Conversely, government mandates and efforts to shoehorn IP interconnection into legacy regulations and concepts would detract from and in some cases defeat the inherent benefits and efficiencies of IP technology. Legacy regulations like the filing requirements of § 252 of the Communications Act were written for a different era. State-by-state regulation of IP interconnection for VoIP under these requirements would harm and delay the transition to new IP-based networks. Subjecting IP interconnection agreements to the § 252 process and approval by 50-plus state commissions is

unworkable as a practical matter and would negate much of the efficiency to be gained from exchanging VoIP traffic between networks in IP format.

IP interconnection and VoIP traffic exchange are characterized by complex technical issues for which there is no single set of standards but many potential alternatives and options. A patchwork quilt of state regulatory requirements cannot provide the flexibility that service providers need to customize their IP interconnection arrangements in response to different circumstances from one implementation to another.

Q. WHAT ARE EACH WITNESS'S RESPONSIBILITIES REGARDING THIS TESTIMONY?

A. Each witness has reviewed and concurs with the entire testimony. However, Mr. Spinelli is primarily responsible for technical issues, Ms. Schlabs is primarily responsible for contract issues, and Mr. Vasington is primarily responsible for policy issues. There are also many legal issues related to this dispute, but we are not lawyers, so we will signal those issues here but leave their detailed treatment to legal briefs.

II. FEATURES OF VOIP SERVICES

Q. WHAT IS VOIP?

A. VoIP is an innovative, any-distance, multi-function service. VoIP enables real-time, two-way voice communications that originate from or terminate to an end user in Internet Protocol format. VoIP also uses a broadband connection at the end user's location. The use of IP enables VoIP providers to integrate various capabilities seamlessly into the any-distance voice services. As described more fully below, VoIP converts a customer's voice

into digital data packets and routes the packets over IP networks, which allows much more efficient transmission of voice calls than telephone calls carried over the Public Switched Telephone Network ("PSTN"). FiOS Digital Voice is Verizon's VoIP service.

Q. PLEASE DESCRIBE VERIZON'S FIOS DIGITAL VOICE SERVICE.

A. FiOS Digital Voice relies on the benefits of IP technology to offer consumers an integrated suite of functions, combining voice communications with capabilities like online account configuration and management, voicemail with email notification and call screening, call scheduling, simultaneous ring, phone numbers that are not associated with the customer's geographic location, and many others. FiOS Digital Voice also intertwines voice communications with other widely used communications platforms, including the Internet, wireless devices and television.

The FiOS Digital Voice online Account Manager allows the customer to configure and manage her services using a computer or a wireless device, including reviewing a log of her calls, accessing and playing back her voice mail messages, placing a call directly from the call log or the FiOS Digital Voice phone book, and setting up and customizing many other functions. The customer can access her online Account Manager from a computer, tablet, smartphone, or other device with Internet access, from anywhere. The Verizon FiOS Digital Voice User Guide, attached hereto as Verizon Exhibit 1, explains the Account Manager and the many other information services components of FiOS Digital Voice.

Other FiOS Digital Voice capabilities include call scheduling – the ability to place a call automatically to a given telephone number at a time and date pre-set by the user –

and reminder messages, which allow the customer to record a message to herself and have FiOS Digital Voice deliver it to her at a pre-selected time(s) and date(s). *See* FiOS Digital Voice User Guide at *Id.*, at 15, 26. Do Not Disturb allows the customer to send all of her calls directly to voice mail or to a prerecorded message, or the customer can direct FiOS Digital Voice to ring through only those calls from a specific list of telephone numbers. *Id.*, at 12. Voice Mail Screening allows a FiOS Digital Voice customer to listen in as a caller leaves a message (essentially allowing a call to be completed to two different locations – the customer's phone and the Verizon server that supports Voice Mail – at the same time) and to interrupt and take the call if desired. *Id.*, at 26. IP technology allows FiOS Digital Voice to hand the call off between these two platforms. More generally, the many capabilities of FiOS Digital Voice derive from application software that, with the call itself already in digital format, supports interfaces among and across various platforms.

Additional FiOS Digital Voice functions untether the service from the single geographic location of the customer's service address and eliminate the geographic limitations that restrict Plain Old Telephone Service (POTS) on the PSTN. For example:

- The customer can listen to her voice mails online on her Account Manager using any device with Internet capability, from any location.
- The customer can program FiOS Digital Voice to send an email to a specified address -- for example, the customer's office computer -- notifying her that she has a voice mail message and attaching that message in a digital file so that the customer can listen to it and permanently save it to her computer or

other storage device. *Id.*, at 20. The customer can also direct FiOS Digital Voice to notify her of a voice mail by text to a smart phone. *Id.*, at 25.

- With the Simultaneous Ring function, IP technology allows an incoming call to ring up to three different phone numbers at the same time – for example, the customer's cell phone, office phone and a friend's line. The call will be completed to the first phone that is answered, even if that is not the customer's home phone. *Id*., at 15.
- A FiOS Digital Voice customer can choose a telephone number from area codes and exchanges that do not on the PSTN serve her town. And Virtual Telephone Number allows the customer to purchase up to five additional telephone numbers, also from outside her PSTN area code. Calls to any of these numbers will ring the customer's FiOS Digital Voice line. *Id*. at 29.

Beyond all of this, many of the functions that comprise FiOS Digital Voice are accessible from the customer's smartphones, tablets, computers, and televisions. *See id*., at 3, 30-31. If the customer is watching TV when a call comes in, FiOS Digital Voice provides caller ID information on the television. *Id*. at 10. The customer can also use her television to review her call log, place a phone call, look up a directory listing (including searching for a business by category), listen to voice mails (which automatically pauses the action on the television) and turn on and off other FiOS Digital Voice functions, including Do Not Disturb and Simultaneous Ring. This seamless integration of voice service with the television and other devices is possible because the hardware/software platform that supports FiOS Digital Voice functionality uses IP technology.

In sum, two-way, real-time voice communications is only one of the integrated capabilities of FiOS Digital Voice. In fact, the FiOS Digital Voice User Guide devotes only one page (page 4) to making phone calls and 25 pages (pages 5-29) to the other capabilities of the service.

Q. WHAT CAPABILITIES DOES COMCAST'S VOIP SERVICE OFFER?

A. We understand that Comcast's XFINITY Voice offers a number of capabilities similar to those of FiOS Digital Voice.

III. DIFFERENCES BETWEEN CIRCUIT-SWITCHED NETWORKS AND IP NETWORKS

Q. PLEASE SUMMARIZE HOW TELEPHONE CALLS ARE TRANSMITTED IN A CIRCUIT-SWITCHED NETWORK.

A. Time Division Multiplexing, or TDM, is the traditional protocol in which telephone calls are transmitted between service providers in a circuit-switched network like the PSTN. In order to deliver a call to its destination, a circuit-switched network has to create a dedicated pathway that covers the entire distance from the calling party to the called party and must maintain that pathway for the duration of the call. To that end, a service provider must either build or lease TDM transmission facilities and deploy a network of switching equipment devoted to call processing.

Q. PLEASE SUMMARIZE WHAT INTERNET PROTOCOL IS AND HOW IT IS USED TO CARRY VOIP TRAFFIC.

A. The technology and network facilities that route and carry Internet Protocol traffic are new and work in a different way than circuit-switched networks. "Internet Protocol" or "IP" refers to a set of standards that permit computers and networks to connect, communicate, and transfer data between them. IP networks transmit information in packets of data. "Voice over Internet Protocol" or "VoIP" encodes an analog voice signal into data packets and enables the set-up and transmission of voice calls over IP networks such as the Internet and private IP networks.

Unlike the PSTN, an IP network does not need a dedicated physical pathway to carry a call all the way from the caller to the called party. In addition, the layers of switches that separate PSTN calls into local, tandem and interexchange segments are eliminated. Rather, routers on an IP network will direct the data packets carrying a voice call along multiple pathways that may be constantly changing. The first router receiving the data packets will decide how best to forward them based on a number of network considerations, such as pathway availability. The router may send some of the packets to one router and other packets to one or more different routers. Each of those routers in turn decides how best to forward the packets it receives the next step of the way, and so on until all of the packets are reassembled at their destination. Routers make different choices over time, so data packets do not necessarily follow the same pathways traveled by packets earlier in the same call. Routers and the other physical infrastructure comprising an IP network are generally not devoted solely to voice traffic but carry video and non-voice data as well.

Q. HOW HAVE COMPANIES INTERCONNECTED TO EXCHANGE VOICE TRAFFIC ON THE PUBLIC SWITCHED TELEPHONE NETWORK?

A. Historically, because the PSTN is circuit-switched, companies interconnected and exchanged traffic with one another in TDM format.

Q: CAN EXISTING TDM INTERCONNECTIONS SUPPORT VOIP?

A. Yes. And they do. Companies today successfully exchange VoIP traffic through those existing PSTN interconnection arrangements in TDM format. Thanks to those existing arrangements, VoIP services have flourished, growing at an incredible rate.

VoIP-PSTN traffic must be converted to TDM at some point in order to complete the call. Currently, the VoIP provider is responsible for performing that conversion, and may do so itself or by contracting with one of the many companies in the marketplace offering IP-to-TDM conversion services. This conversion is necessary regardless of whether the VoIP provider is an ILEC, a CLEC, a cable company, a wireless broadband provider, or a company like Vonage, Skype, or Google.

Q: WHAT ARE SOME OF THE DIFFERENCES BETWEEN CIRCUIT-SWITCHED INTERCONNECTIONS AND INTERCONNECTIONS IN IP FORMAT?

A. The ways in which IP networks route data packets allow for far more efficient interconnection of IP networks than interconnection of circuit-switched networks that are routing traffic over dedicated pathways in TDM format. For example, CLECs and CMRS providers interconnect with ILECs at one POI per LATA, at a minimum, to exchange PSTN traffic between their respective customers. Each LATA where the carriers have customers requires at least one TDM interconnection arrangement and one

POI. (Massachusetts has two LATAs – one encompassing the 413 area code, and the other the rest of the state.) Where the carriers have substantial traffic volumes, it is not uncommon to have dozens of connections to circuit switches (both tandems and end offices) in a single LATA. With nearly 200 separate LATAs, interconnecting carriers operating in multiple jurisdictions may have hundreds of POIs and thousands of connections in their TDM interconnection arrangements across the country. In addition, an intermediate carrier, commonly an interexchange carrier (IXC), is often used to carry traffic between LATAs.

In contrast, VoIP service providers can exchange all domestic traffic across the country in IP format pursuant to a single IP interconnection arrangement and over a limited number of mutually-agreed-upon interconnection points. Verizon and Comcast, for example, have interconnected in IP format at ***** Begin Confidential ***** [redacted] ***** End Confidential ***** The use of IP routing enables Verizon and Comcast efficiently to route calls between customers in Massachusetts through these distant interconnection points, because the routers and transmission pathways involved are not dedicated to that (or any) particular call, and the routers can intelligently process large volumes of traffic at high speed on to many different destinations. Only a few such interconnection points, moreover, are needed to provide the level of redundancy needed to ensure a high level of service quality.

Q. GIVEN THESE EFFICIENCIES, PLEASE DISCUSS VERIZON'S INCENTIVES TO INTERCONNECT IN IP FOR VOIP TRAFFIC.

A. Verizon has significant business incentives to pursue IP interconnection for VoIP traffic, and its actions confirm those incentives. For the growing volume of traffic that both originates and terminates in VoIP, IP interconnection allows Verizon and other service providers to avoid the needless expense of converting VoIP-originated traffic to TDM format solely to exchange it with another provider that will then have to convert the traffic back to IP to deliver it to its VoIP customer on the terminating end. In addition, it is more efficient for Verizon to transport the data packets that comprise a VoIP call over whichever pathways between IP routers are most efficient as the call progresses than it is to dedicate a physical connection to carry a POTS call between the caller and the called party, over a series of end-office and tandem switches dedicated solely to voice traffic, and to maintain that same connection for the duration of the call. And as noted above, IP interconnection enables providers (including Verizon) to reduce the number of interconnection points they need to maintain from hundreds to a mere handful. It makes business sense for VoIP providers – Verizon included – to pursue IP interconnection arrangements, especially where traffic is IP on both ends and both parties have maximum incentive to interconnect and exchange traffic in IP format. As more customers move to Verizon's FiOS Digital Voice VoIP service, Verizon's market-based incentives to enter into IP interconnection arrangements for VoIP traffic will continue to grow.

IV. THE AGREEMENTS

Q. WHAT ARE THE AGREEMENTS THAT ARE THE SUBJECT OF THIS PROCEEDING?

A. Verizon and Comcast have entered into three agreements that in some way address the exchange of voice traffic in IP: ***** Begin Confidential ***** [redacted] ***** End Confidential *****

Q. PLEASE DESCRIBE THE SETTLEMENT AGREEMENT.

A. ***** Begin Confidential ***** [redacted] ***** End Confidential *****

***** Begin Highly Sensitive Confidential ***** [redacted]

[redacted] ***** End Highly Sensitive Confidential *****

At the time, neither party fully understood exactly how they would exchange traffic in IP format. ***** Begin Highly Sensitive Confidential ***** [redacted]

Q. [redacted]

[redacted]

A. [redacted]

[redacted]

[redacted]

[redacted]

[redacted] ***** End Highly Sensitive Confidential *****

Q. DOES THE SETTLEMENT AGREEMENT INCLUDE THE TERMS AND CONDITIONS UNDER WHICH THE PARTIES WOULD INTERCONNECT AND EXCHANGE TRAFFIC?

A: ***** Begin Highly Sensitive Confidential ***** [redacted]

[redacted] ***** End Highly Sensitive Confidential *****

Q. PLEASE DESCRIBE THE TRAFFIC EXCHANGE AGREEMENT.

A. ***** Begin Highly Sensitive Confidential ***** [redacted]

[redacted]

[redacted] ***** End Highly Sensitive Confidential ***** *See* Verizon Exhibit 3 (Highly Sensitive Confidential Information). At the time, there was substantial disagreement among communications service providers over the appropriate intercarrier compensation rates for VoIP traffic, particularly whether existing state and federal switched access tariffs should apply to VoIP. ***** Begin Confidential ***** [redacted]

[redacted]

[redacted] ***** Begin Highly Sensitive Confidential ***** [redacted] ***** End Highly Sensitive Confidential *** *** End Confidential ***** The FCC subsequently put in place an intercarrier compensation regime that included prospective default rates that explicitly applied to PSTN-VoIP traffic.[1] ***** Begin Highly Sensitive Confidential ***** [redacted] ***** End Highly Sensitive Confidential *****

Q. DO THE RATES IN THE TRAFFIC EXCHANGE AGREEMENT SUPPLANT THE RATES IN THE LEGACY INTERCONNECTION AGREEMENT BETWEEN VERIZON MA AND COMCAST FOR MASSACHUSETTS?

[1] In the Matter of *Connect America Fund; A National Broadband Plan for our Future; Establishing Just and Reasonable Rates for Local Exchange carriers; High-Cost Universal Service Support; Developing A Unified Intercarrier Compensation Regime; Federal-State Joint Board on Universal Service; lifeline and link-Up; Universal Service Reform – Mobility Fund,* Notice of Proposed Rulemaking and Further Notice of Proposed Rulemaking, 26 FCC Rcd 4554, ¶ 679 (November 18, 2011).

A. No. The legacy interconnection agreement only sets rates for traffic that would be considered "local" based on where the traffic originates and terminates. Under § 2.2 of the Traffic Exchange Agreement, ***** Begin Highly Sensitive Confidential ***** [redacted] ***** End Highly Sensitive Confidential ***** Verizon MA's existing interconnection agreement with Comcast Phone of Massachusetts, Inc. provides that the rate for local traffic is $0. *See* Verizon MA – Comcast ICA, Amendment No.1, Attachment No. 1, produced in discovery as Attachment CC-VZ 1-3. ***** Begin Highly Sensitive Confidential ***** [redacted] ***** End Highly Sensitive Confidential *****

Q. PLEASE EXPLAIN THE PURPOSE AND BASIC TERMS OF AMENDMENT NO. 1 TO THE TRAFFIC EXCHANGE AGREEMENT.

A. After executing the Settlement Agreement and the Traffic Exchange Agreement, the parties worked to develop and implement the exchange of VoIP traffic in IP format that the Settlement Agreement contemplated. In the course of that work, it became apparent that ***** Begin Confidential ***** [redacted]

[redacted] ***** End Confidential *** *** Begin Highly Sensitive Confidential ***** [redacted]

[redacted] ***** End Highly Sensitive Confidential *****

Q. PLEASE DESCRIBE THE THIRD AGREEMENT, THE VOIP-TO-VOIP AGREEMENT.

A. ***** Begin Highly Sensitive Confidential ***** [redacted]

***** End Highly Sensitive Confidential *** *** Begin Confidential ***** [redacted]

[redacted] ***** End Confidential *** *** Begin Highly Sensitive Confidential ***** [redacted] ***** End Highly Sensitive Confidential *****

Q. WHAT TRAFFIC IS GOVERNED BY THE VOIP-TO-VOIP AGREEMENT?

A. ***** Begin Highly Sensitive Confidential ***** [redacted]

[redacted] ***** End Highly Sensitive Confidential *****

Q. DOES THE VOIP-TO-VOIP AGREEMENT ADDRESS TRAFFIC EXCHANGED IN TDM FORMAT?

A. ***** Begin Highly Sensitive Confidential ***** [redacted] ***** End Highly Sensitive Confidential *****

V. <u>THE VERIZON-COMCAST IP INTERCONNECTION ARRANGMENTS</u>

Q. PLEASE EXPLAIN HOW VERIZON AND COMCAST ARE EXCHANGING VOICE TRAFFIC IN IP FORMAT IN ACCORDANCE WITH THE AGREEMENTS YOU HAVE DISCUSSED.

A. Verizon and Comcast have physically interconnected their IP networks ***** Begin Confidential ***** [redacted]

[redacted] ***** End Confidential *****

When a Comcast customer calls a Verizon VoIP customer, the call leaves the Comcast customer's premises in IP format. To determine how to route the call, the Comcast network ***** Begin Confidential ***** [redacted] ***** End Confidential *****

A hypothetical example may be helpful. Carl, a Comcast customer in Waltham, checks his online call log from his laptop and dials on (617) 123-4567, the number of his friend Victor who lives in Newton. Comcast's network obtains information from *******

Begin Confidential * [redacted] *** End Confidential ***** The data packets that comprise their call contents (the "media") may take different routes along the way and pass through servers in states that are not located between Massachusetts **** Begin Confidential *** [redacted] *** End Confidential ***.

Q. WHAT HAPPENS AT COMCAST'S IP NODE?

A. **** Begin Confidential *** [redacted]

[redacted] ***** End Confidential *****

Q. WHAT HAPPENS ONCE THE CALL IS SET UP?

A. Let's return to the example of Carl in Waltham calling Victor in Newton. ***** Begin Confidential ***** [redacted] ***** End Confidential *****

Victor, however, is watching TV. Based on the choices he made through his online Account Manager, Victor's FiOS Digital Voice service causes Victor's home phone, his cell phone and his office phone to ring at the same time. It also shows Carl's Caller ID on Victor's television, but Victor fails to answer either his home phone or his cell phone, both of which are ringing. Carl leaves a message on Victor's voice mail,

which converts it to a digital sound file and emails it to Victor's office computer in Boston where he will listen to it tomorrow.

Q. IS A VOIP-TO-VOIP CALL EXCHANGED BETWEEN VERIZON AND COMCAST CONVERTED TO TDM PROTOCOL?

A. ***** Begin Confidential ***** [redacted]

***** End Confidential *****

Q. WHAT IS A CODEC?

A. Codecs are devices or software that encode or decode an audio signal to and from a digital data stream in IP format. With VoIP, codecs are the means of encoding analog speech into data packets to allow it to travel the IP network, and then to decode the packets and return them to an audio signal on the call's other end. VoIP service providers can choose from many different codecs in providing VoIP service to their customers. Where interconnected IP providers use different codecs, a call exchanged between them in IP format must be transcoded – *i.e.* converted from the original codec into the codec used on the terminating VoIP network – in order to be completed. ***** Begin Confidential ***** [redacted]

[redacted] ***** End Confidential *****

Q. HOW IS A CALL THAT IS ORIGINATED BY A VERIZON FIOS DIGITAL VOICE CUSTOMER EXCHANGED WITH COMCAST IN IP FORMAT?

A. Essentially in the way described above, but in reverse. ***** Begin Confidential ***** [redacted]

Q. [redacted]

A. [redacted]

***** End Confidential *** *** Begin Highly Sensitive Confidential ***** [redacted]

[redacted] ***** End Highly Sensitive Confidential *****

Q. PLEASE SUMMARIZE WHICH TRAFFIC EXCHANGED BY VERIZON AND COMCAST IN IP FORMAT IS CONVERTED TO TDM PROTOCOL AT SOME POINT AND WHICH TRAFFIC IS NOT.

A. ***** Begin Confidential ***** [redacted]

[redacted] ***** End Confidential *****

Q. WHY IS THAT SIGNIFICANT?

A. Where VoIP-PSTN traffic is exchanged in TDM format, the VoIP provider frequently converts the traffic from IP to TDM protocol and hands the traffic off to a CLEC middleman, which delivers it to the terminating provider in accordance with the CLEC's legacy interconnection agreement. The CLEC will also receive TDM traffic and deliver it to the VoIP provider, which will convert it to IP format for delivery to the end user.

***** Begin Confidential ***** [redacted]

[redacted]

[redacted] ***** End Confidential *****

VI. THE DEPARTMENT SHOULD NOT IMPEDE THE TRANSITION TO IP NETWORKS BY REQUIRING PROVIDERS TO FILE IP INTERCONNECTION AGREEMENTS FOR VOIP TRAFFIC.

Q. PLEASE DESCRIBE THE ORIGINS OF THE INTERCONNECTION FRAMEWORK IN THE TELECOMMUNICATIONS ACT OF 1996.

A. Understanding how the interconnection framework developed in the Telecommunications Act of 1996 ("1996 Act") operates helps to understand how it was created for a different market structure and state of technology, so it would be harmful policy to try to "fit" IP interconnection for VoIP into this framework.

One of the 1996 Act's purposes was to implement national policy to break the monopoly on local exchange service held by the ILECs, including the predecessor company to Verizon -- New England Telephone and Telegraph Company, which when the 1996 Act was passed was doing business as NYNEX, later Bell Atlantic, and finally as Verizon Massachusetts.

In fact, when the 1996 Act passed in February 1996, the monopoly in Massachusetts already had been broken in terms of legal requirements – the Massachusetts Department of Public Utilities had taken that step in 1985 – but the necessary details that needed to be implemented for local competition had not been in place. The Department had taken many steps to promote competition post-1985, including approving collocation, reforming pricing of retail services, eliminating

competitor certification requirements, and approving local entry tariffs filed by competitors.

One of the most important components of local exchange competition was interconnection of competing networks, and, because of the historical role that the ILECs had played as government-endorsed monopolies, Congress and the FCC adopted a framework for interconnection that required the ILECs to negotiate interconnection agreements with new entrants and to submit disputes to state commissions for arbitration if negotiation failed. Under the market conditions that existed in 1996, the FCC found that the ILECs would lack incentives to interconnect without those requirements.

The 1996 Act and the FCC also adopted principles and rules to guide those negotiations and state arbitration in the event that negotiations did not lead to agreement. These principles and rules *by design* favored the CLECs' cost structure and preferences for interconnection arrangements between ILECs and CLECs, with little or no consideration of whether the interconnection arrangement was cost-efficient for the ILEC in question. This was done in order to promote new entry as quickly as possible by reducing economic barriers to entry for the new competitors. This "thumb on the scale" in favor of CLECs made sense in 1996 in the context of opening up the local exchange market because of the aforementioned historic and entrenched monopoly held by the ILECs. However, given *current* marketplace and technological realities, it no longer makes sense to apply this asymmetric treatment to interconnection, even for legacy services, and it certainly does not make sense to apply it to VoIP.

Q. HOW HAS THE MARKET STRUCTURE CHANGED SINCE 1996?

A. Changes in the marketplace have been profound. Where there once was monopoly, there is now robust competition and consumer choice. Until the 1990s, if you wanted to talk with someone outside of your presence, you had to use a phone line provided by an ILEC to call a fixed location that you hoped would be in the vicinity of the person you wanted to talk to. Now customers can choose whether to call a person (not just a location) using a telephone handset (wired or wireless) – using a service provided by the ILEC, or, more commonly, a CLEC, cable company, or wireless provider – a video game console, or through a VoIP service, such as Skype. Or, if they don't want to talk, they can send a text, or an e-mail, or a tweet, or Facebook message. Customers regularly have access to, and switch back and forth between, these many ways of communicating, and no longer rely on just one option. The point is that the regulatory framework – including the 1996 Act's interconnection framework, even when applied to legacy service – is outdated and has been overtaken by a fundamental revolution that has reshaped the way in which customers communicate. The policy debates of the past, including about ILEC incentives to interconnect, have little relevance to the way customers communicate today.

From 2006 through 2012, the total number of ILEC switched access lines nationally, including business and residential lines, fell from 142 million to 75 million.[2] In recent years, line losses have been especially pronounced in the residential

[2] FCC, "Local Telephone Competition: Status as of December 31, 2012," (released November 2013), at Table 5.

marketplace. The percentage of U.S. households using ILEC-switched voice has fallen from 84 percent in 2005 to an estimated 32 percent as of 2012.[3]

Former ILEC POTS customers have not disappeared, but have shifted to other technologies: wireless services, which are not subject to state economic regulation, and VoIP provided by cable companies, "over-the-top" providers, and the ILECs themselves. Indeed, the portion of U.S. telephone households that have "cut the cord" and rely entirely on wireless for their voice service has risen from less than five percent in 2003 to more than 39 percent today, while an additional 16 percent of households rely mostly on their wireless phones.[4] In other words, there are more households that have chosen to "cut-the-cord" and subscribe only to wireless service than there are households that subscribe to a switched-access service provided by an ILEC.

Q. THESE ARE NATIONAL DATA. HAS A SIMILAR MARKET EVOLUTION TAKEN PLACE IN THE COMMONWEALTH?

A. Yes. As the chart below shows, Verizon MA has lost almost 60 percent of its lines since 2000 (even counting growth in FiOS Digital Voice). Within the landline sub-part of the

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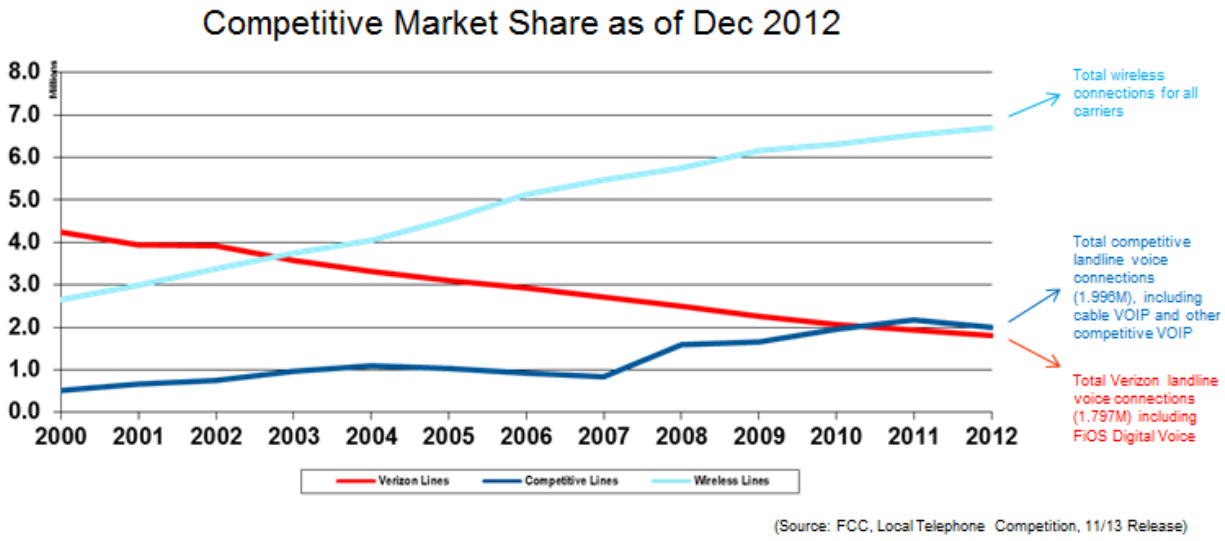
[3] Patrick Brogan, USTelecom, "The Transformation of Personal Communications and the Erosion of Traditional Voice Provider Dominance" presented at the Telecommunications Research Policy Conference (September 22, 2012; revised and updated November 15, 2012) ("Brogan - Transformation of Personal Communications") at Figure 11 available from http://www.ustelecom.org/sites/default/files/documents/Voice%20Competition%20TPRC%202012-11-15.pdf .

[4] *Id*. at Figure 11. Blumberg SJ, Luke JV. Wireless substitution: Early release of estimates from the National Health Interview Survey, January–June 2013. National Center for Health Statistics. December 2013. Available from: http://www.cdc.gov/nchs/nhis.htm.

marketplace, CLECs now have more lines than Verizon.[5]



This is hardly the picture of an "incumbent" with market power. Today, if Verizon MA did not interconnect with other providers, its customers would not be able to make or receive calls to and from more than half of the households in Massachusetts, or to wireless subscribers. Verizon has strong incentives to interconnect, just like other providers do.

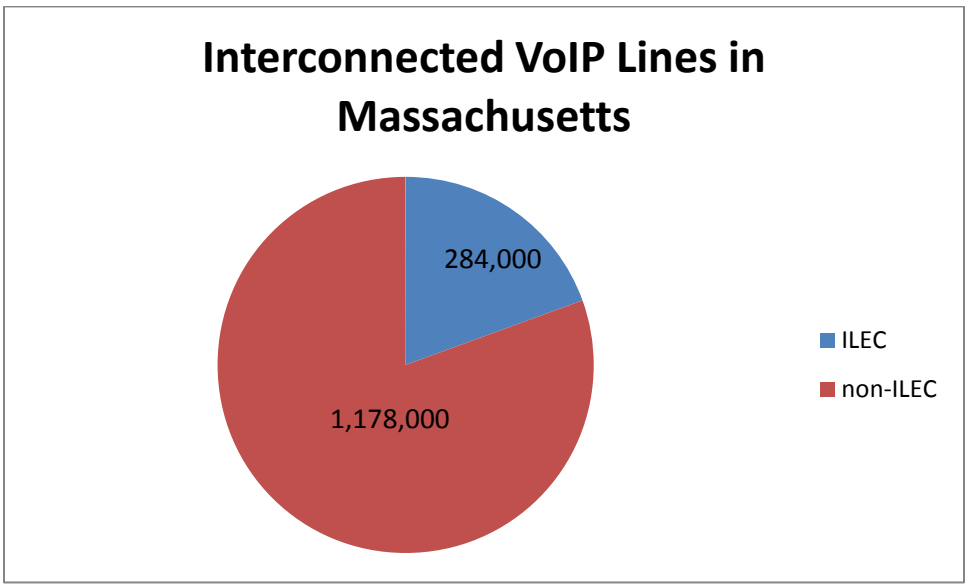
Q. PLEASE DESCRIBE COMPETITION FOR VOIP SERVICES IN MASSACHUSETTS.

A. Verizon cannot be considered to be an "incumbent" or to wield market power for VoIP services. Verizon was not the first company to offer VoIP in Massachusetts, and it is far from the largest provider. When Verizon started offering its FiOS Digital Voice VoIP service in Massachusetts in 2009, there were already 795,000 non-ILEC VoIP lines in

[5] Data from the chart are taken from FCC Local Competition Reports, which show ILEC lines in Massachusetts. There are four other ILECs in the Commonwealth, but each of them serves fewer than 2000 lines.

Massachusetts.[6] As one example, Comcast began offering digital phone service in 2005.[7] Also, while Verizon has just over 4 million residence FiOS Digital Voice connections nationwide,[8] there are 26.7 million cable phone customers and, more broadly, more than 35 million non-ILEC interconnected VoIP lines in the United States.[9]

When looking at data for VoIP lines, it is important to note that the FCC's local competition reports include data only for "interconnected VoIP,"[10] which excludes providers like Skype. As a result, the data understate the size of the VoIP marketplace in general and the number of lines served by competitors in particular. However, even for interconnected VoIP services, Verizon has only a small piece of the pie, as the following chart using FCC data demonstrates.[11]



[6] FCC, Local Competition Report: Status as of December 31, 2008, rel. July 2010, at Table 8.
[7] http://corporate.comcast.com/our-company/our-story.
[8] http://www.verizon.com/investor/DocServlet?doc=3q_13_vz_bulletin.pdf. Data as of September, 2013.
[9] http://www.ncta.com/industry-data. FCC, Local Competition Report: Status as of December 31, 2012, at Figure 4.
[10] FCC, Local Competition Report: Status as of December 31, 2012, at 1, n.2.
[11] *Id.*, at Table 9.

Q. YOU NOTE THAT THE 1996 ACT'S INTERCONNECTION FRAMEWORK IMPOSES HEAVIER BURDENS ON INCUMBENT LECS. ARE THERE INCUMBENT CARRIERS FOR VOIP?

A. No. In this innovative new world of IP networks, there are no incumbents. Everyone is a new entrant. Because there are no incumbent networks or providers, there is no good policy reason to regulate one set of companies differently than others. If any company is to be classified as a VoIP incumbent, it is not ILECs, which are far from the largest VoIP providers and did not provide the service before others. There simply is no support for the notion that the incumbent LECs or any other company has market power when it comes to IP interconnection for voice. As an analogy, if the 1996 Act's interconnection framework were applied to VoIP, that would be like imposing new rules for Internet searches on AOL, since it used to be the largest player in a different part of the Internet business, but exempting Google as a so-called new entrant.

Q: YOU MENTIONED ABOVE THAT VERIZON'S ACTIONS CONFIRM ITS INCENTIVES TO INTERCONNECT IN IP FORMAT. WHAT ACTIONS ARE THOSE?

A: Verizon has taken a leading role in fostering IP interconnection arrangements. Verizon has made clear for some time in its advocacy and elsewhere that it supports the development of IP VoIP interconnection through commercially negotiated agreements.[12] And in June of 2013, although Verizon had by then received relatively few requests to interconnect in IP format for VoIP, Verizon sent letters inviting several companies to

[12] *See e.g.*, Comments of Verizon (February 24, 2012) and Reply Comments of Verizon (March 30, 2012) in Federal Communications Commission, *Connect America Fund*, WC Docket 10-90 *et al.*

begin negotiations. The initial set of companies included those that had shown an interest in IP interconnection at the FCC and at the Department. We subsequently sent letters to other companies, including those that approached us and others that we identified and approached. In addition to the Comcast agreements, we completed two IP interconnection agreements for VoIP at the end of 2013, with Vonage and BroadVox, and we completed a fourth in early 2014 with InterMetro. Finally, based on our experience with IP interconnection, we have developed a process to negotiate additional IP interconnection agreements for VoIP traffic.

Q. PLEASE EXPLAIN THE PROCESS VERIZON HAS DEVELOPED.

Going forward, Verizon expects to implement IP interconnection arrangements for VoIP through the negotiation of two principal documents: an IP Interconnection Agreement and a SIP Interconnection Plan. In 2013, we developed templates for each. The IP Interconnection Agreement template includes an Interconnection Attachment that, generally speaking, would establish macro-level requirements for the companies' IP interconnection arrangements, while the SIP Interconnection Plan implements those requirements through technical and operational details. The IP Interconnection Agreement template and the SIP Interconnection Plan template were produced in discovery as Confidential Attachments CC-VZ 1-6(a) and CC-VZ 1-6(b), respectively. To be clear, we intend to use these documents as a starting point to facilitate negotiations, and we are open to negotiating changes in order to reach agreement. Providers seeking to interconnect in IP format need to agree on a number of detailed technical issues in any event.

Q. PLEASE DISCUSS SOME OF THE DETAILED TECHNICAL REQUIREMENTS THAT PROVIDERS MUST NEGOTIATE AND CUSTOMIZE IN ORDER TO INTERCONNECT IN IP FORMAT.

A. Bilateral IP interconnection for voice traffic between two VoIP providers involves, at a minimum, a physical interconnection, an IP interface, and call signaling and set up. For each, the interconnecting parties must negotiate specific technical considerations. VoIP providers, not regulators, are in the best position to work through the complicated, detailed requirements.

At a high level, the two providers need to negotiate and agree upon some macro-level rules that govern their interconnection. Those macro-level rules cover several key areas.

Interconnection Points. This includes number, location, capacity, and associated costs.

Scope of Traffic. This defines the traffic the providers will exchange over the IP interconnection arrangements. Verizon expects this would include the exchange of traffic from coast to coast, not limited to exchanging traffic within a LATA or even a single state.

Codecs and Transcoding. Codecs are the necessary protocols for encoding and decoding the voice in an IP-enabled scenario. The interconnecting providers must agree upon a list of acceptable Codecs for exchanging traffic, a process for making changes to that list in the future, and the companies' responsibility for transcoding where the originating company and terminating company are using different Codecs.

Service Quality and Disaster Recovery. The providers must negotiate service-quality terms and conditions and also methods and procedures for disaster recovery.

In addition to these macro-level interconnection rules, the interconnecting companies must agree upon applicable rates and charges. And they also must work though other more granular details that will govern the IP interconnection arrangement. These details will be customized and specific to each arrangement. These include details related to signaling for call setup and delivery, call routing, traffic forecasts, and testing.

Q. WHAT WOULD BE THE RESULT OF APPLYING THE 1996 ACT'S INTERCONNECTION REGIME TO IP INTERCONNECTION FOR VOIP?

A. Applying the 1996 Act's interconnection regime to IP interconnection for VoIP would harm the transition to IP-based networks. Backwards looking regulatory requirements can disrupt the progress being made through commercial negotiations and agreements. The Department and other regulators can best facilitate and encourage the natural, market-driven move to commercial IP interconnection arrangements by removing regulatory obstacles so that companies can move to new IP technologies and services faster. Moreover, there would be little benefit, because the current interconnection options for VoIP traffic have not hindered the growth in VoIP in the least.

If IP interconnection for VoIP were handled through the Section 252 interconnection agreement process, disputes about IP interconnection arrangements' specific details would be resolved not by technical experts, but by more than fifty different state public utility commissions applying their own views of appropriate IP interconnection arrangements, and with a framework that by design does not take

efficiency considerations into account for one side of the agreement (the so-called ILEC side). Unlike the PSTN, where carriers often have dozens of points of interconnection in a single LATA or within a single state for TDM interconnection, with IP interconnection for VoIP, regulatory vestiges like LATAs are irrelevant, as are state boundaries. The Section 251/252 framework would force a patchwork of potentially inconsistent state regulation onto the same IP interconnection arrangements – arrangement that many times will not even call for a point of physical interconnection in the regulating state.

Also, the Department and other state commissions would not have the benefit of FCC rules or guidance related to IP interconnection for VoIP, as they did with circuit-switched interconnection. The FCC has noted the importance of national rules.[13] There are no national rules in place governing interconnection for VoIP services, so the Department and other state commissions would be reviewing agreements and arbitrating disputes without any guidelines and with little prospect of coordination or consistency among states. Furthermore the technical characteristics of VoIP do not lend themselves to different decisions by different states.

Q. PLEASE EXPLAIN.

A. There are significant differences between interconnection of circuit-switched networks and interconnection of IP networks. With just a single IP interconnection arrangement and as few as two geographically diverse interconnection points, VoIP service providers can exchange all domestic traffic between their respective customers across the country. There is no need for separate interconnection arrangements within LATAs or

[13] Local Comp. Order at ¶ 179.

intermediate carriers for traffic between LATAs. Consider what would happen if Verizon were to establish a VoIP interconnection point in Newark, New Jersey to handle traffic throughout the Northeast, and each state where Verizon is an ILEC were to arbitrate interconnection agreements dealing with VoIP traffic exchange at that interconnection point. It is hard to imagine that every Verizon ILEC state would reach the same conclusions in separate arbitrations, so that single interconnection point could be subject to more than ten different technical and pricing requirements. The concept of a local exchange carrier selling wholesale interconnection services within local exchange areas does not fit at all with the IP interconnection model.

Q. GIVEN THESE INEFFICIENCIES, WHY ARE SOME PROVIDERS INSISTING ON APPLYING THE 1996 ACT'S FRAMEWORK TO IP INTERCONNECTION FOR VOIP?

A. We don't know. We can only surmise. But we do know that some of the same companies that are insisting on a regulatory solution refuse to pursue a commercial solution with Verizon. And those companies have a perverse incentive to make commercial negotiations fail. With companies that are serious about pursuing IP interconnection for VoIP, Verizon is successfully negotiating and completing agreements.

In terms of the specifics of an IP VoIP interconnection agreement, it may be that the CLECs are looking to push the cost of protocol conversion to the ILECs, Verizon MA in this case. Some CLECs have argued to the FCC that ILECs are forcing the CLECs to convert VoIP traffic from IP to TDM just to make the process inefficient. But for a call

between a VoIP customer and a POTS customer, there is no way to avoid the conversion. Incumbent LECs aren't requiring a conversion. The different protocols being used to serve the two customers involved in the call require a conversion. Until all customers are served by VoIP and POTS is eliminated, those conversions will continue to be necessary. The only relevant question, then, is which party should pay for the conversion. The current system of exchanging VoIP-PSTN traffic, under which the VoIP provider performs the conversion, remains the most efficient interconnection method for that traffic. The gateways that perform the protocol conversions are already in place, and because the VoIP provider, not the local exchange carrier (or other provider with whom it may request interconnection) knows the traffic volumes it expects to generate, the VoIP provider knows if and when it will need additional conversion capacity. With that knowledge, the VoIP provider can size and build out gateways as needed. And if the VoIP provider does not want to perform the conversion, there are many third parties in the marketplace who will accept the traffic in IP format and convert it to TDM on the VoIP provider's behalf. By contrast, a direct IP interconnection would not eliminate the need for a conversion to TDM, and it would be no more efficient. Rather, it would only shift the conversion costs and responsibility from one party to another party. Problems can arise when companies look to other companies instead of their customers to cover the costs of the services they provide, such as in the case of the excessive access charges imposed by CLECs in recent years, which the Department remedied in 2009. *See* D.T.C. 07-9, *CLEC Intrastate Access Charges*, (June 22, 2009).

Q. IF THE DEPARTMENT DOES NOT IMPOSE THE 1996 ACT'S INTERCONNECTION FRAMEWORK ON IP INTERCONNECTION FOR VOIP, DOES THAT MEAN THAT THE FLOW OF VOIP TRAFFIC FOR OTHER COMPANIES WILL BE IMPEDED?

A. Not at all. Although we are not attorneys, it is plain that under the FCC's decisions, there is no question that carriers must accept IP-originated traffic through existing TDM interconnection arrangements.[14] Therefore, this case is not at all about enabling the flow of traffic, it is simply about whether it is legal and good policy to try to fit the interconnection of new technologies into the legal framework that was developed for a different time, different market, and different technologies.

VII. CONCLUSION

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.

[14] *See Time Warner Cable Request for Declaratory Ruling that Competitive Local Exchange Carriers May Obtain Interconnection Under Section 251 of the Communications Act of 1934, as Amended, to Provide Wholesale Telecommunications Services to VoIP Providers*, Memorandum Opinion and Order, 22 FCC Rcd 3513 (2007).