Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of:	)	
	)	
Connect America Fund	)	WC Docket No. 10-90
	)	
Developing a Unified Intercarrier Compensation Regime	)	CC Docket No. 01-92
	)	

PETITION OF CENTURYLINK FOR A DECLARATORY RULING

CENTURYLINK
Timothy M. Boucher
Suite 120
931 14th Street
Denver, CO 80202
303-992-5751
Timothy.Boucher@CenturyLink.com

Joseph Cavender
Suite 250
1099 New York Avenue, N.W.
Washington, D.C. 20001
571-730-6533
Joseph.Cavender@CenturyLink.com

John T. Nakahata
Kristine Laudadio Devine
HARRIS, WILTSHIRE & GRANNIS LLP
1919 M Street, NW
The Eighth Floor
Washington, DC 20036
(202) 730-1300
jnakahata@hwglaw.com

May 11, 2018

TABLE OF CONTENTS

INTRODUCTION AND SUMMARY 1

I. CONTROVERSIES OVER VOIP ACCESS RECIPROCAL COMPENSATION CONTINUE TO EXIST AND AFFECT ONGOING TRAFFIC EXCHANGES. 2

II. THE APPLICABLE RULES AND THE REASONS FOR THEIR ADOPTION. 4

A. The Applicable Rules 4

B. The Commission's Rationale for Adopting the Symmetry Rule. 5

III. APPLICATION OF THE FUNCTIONAL EQUIVALENCE TEST FOR OVER-THE-TOP VOIP PROVIDERS PARTNERED WITH A LEC. 8

IV. REFERENCING "TRUNKS" AND "LOOPS" IS A CIRCULAR AND AN INCOHERENT BASIS FOR FUNCTIONAL EQUIVALENCE DETERMINATIONS. 17

V. END OFFICE LOCAL SWITCHING CHARGES ARE NOT PART OF LOOP COST RECOVERY OR TIED TO THE SIZE OF THE GEOGRAPHIC AREA SERVED. 20

A. Under Part 69 Access Rules, End Office Local Switching Does Not Recover Loop or Port Charges. 21

B. There Is No Limitation on LEC End Office Local Switching Charges Based on the Size of the Geographic Area Served by the Switch. 22

CONCLUSION 24

INTRODUCTION AND SUMMARY

CenturyLink Inc. ("CenturyLink"),[1] pursuant to Section 1.2 of the Commission's Rules,[2] hereby petitions the Commission to "terminate a controversy or remove uncertainty" by issuing a declaratory ruling as to the applicability of end office local switching access reciprocal compensation, under Section 51.913 of the Commission's Rules, for traffic that originates from or terminates to an end user customer of an "over the top" Voice over Internet Protocol ("VoIP") provider that partners with a local exchange carrier ("LEC") to exchange traffic to and from the public switched telephone network ("PSTN").

This issue was the subject of a declaratory ruling issued by the Commission in 2015.[3] That decision was subsequently vacated and remanded by the United States Court of Appeals for the District of Columbia in *AT&T Corp. v. Federal Communications Commission*.[4] That decision, though, did not decide the proper interpretation of the Commission's access reciprocal compensation rules as applied to toll traffic to or from end users of "over the top" VoIP. Nor did the Commission's decision in *AT&T Corp. v. YMax Communications Corp*., which both preceded the adoption of Section 51.913—and thus could not have interpreted or applied Section 51.913—and was expressly limited to the interpretation of YMax's tariff and did not "address issues regarding the intercarrier compensation obligations, if any, associated with [VoIP] traffic."[5] By this petition, CenturyLink seeks to have the Commission complete the remand and

---

1 CenturyLink, Inc. files this petition on behalf of its wholly-owned subsidiaries.

2 47 C.F.R. § 1.2.

3 *Connect America Fund; Developing a Unified Intercarrier Compensation Regime*, Declaratory Ruling, 30 FCC Rcd. 1587 (2015) ("*2015 Declaratory Ruling*").

4 841 F.3d 1047 (D.C. Cir. 2016).

5 *AT&T Corp. v. YMax Communications Corp*., Memorandum Opinion and Order, 26 FCC Rcd. 5742, 5743 ¶ 1 n.7 (2011) ("*YMax I*").

resolve the underlying dispute as to the proper interpretation of its rules. CenturyLink continues to believe that the proper interpretation of these rules as applied to VoIP traffic exchanged with the PSTN is that they permit a LEC partnered with a VoIP provider to collect end office local switching access reciprocal compensation when the LEC and/or its VoIP partner perform certain critical call initiation or termination processes, as further described herein, irrespective of whether the VoIP provider also controls last-mile facilities used to reach the VoIP provider's end user customer.

CenturyLink is interested in a final resolution of this dispute from two perspectives. CenturyLink owns and controls a CLEC entity that partners with VoIP providers to exchange traffic with the PSTN, including those with their own last-mile facilities as well as "over the top" providers, and in that role has sought to collect end office local switching access reciprocal compensation charges. In addition, however, multiple companies in the CenturyLink family of companies more broadly serve as interexchange carriers ("IXCs") that receive access reciprocal compensation invoices. CenturyLink seeks a definitive resolution so that all industry participants know what charges must be paid and when.

I. CONTROVERSIES OVER VOIP ACCESS RECIPROCAL COMPENSATION CONTINUE TO EXIST AND AFFECT ONGOING TRAFFIC EXCHANGES.

Under Section 1.2 of its rules, the Commission may, on motion of an interested party, issue a declaratory ruling terminating a controversy or removing uncertainty. Here, the relevant issue—the applicability of end office local switching access reciprocal compensation for traffic exchanged between a VoIP provider and the PSTN that originates from or terminates to an end user customer of an "over the top" VoIP provider that partners with a local exchange carrier—remains a live issue in three ways.

First, although terminating access reciprocal compensation charges for end office local switching are now at bill-and-keep for price cap carriers, terminating end office access reciprocal compensation charges from periods prior to July 1, 2017 remain in dispute. Second, for rate-of-return LECs and for rural CLECs, terminating end office access reciprocal compensation charges remain until July 1, 2020. Third and finally, this dispute remains with respect to originating access reciprocal compensation, particularly for toll-free (8YY) traffic in which the IXC is billed for originating access reciprocal compensation, including, when applicable, end office local switching, by the originating LEC. The Commission has not yet embarked on any further reform of originating access reciprocal compensation, whether for 8YY or more generally.[6] CenturyLink needs clarity as to its proper payments or receipts in all of these settings.

The continued existence of a dispute is borne out by ongoing litigation regarding these very issues. Teliax, Inc. is a Denver, Colorado-based CLEC providing voice and data services to both retail and wholesale customers, including toll-free origination service. Teliax charges originating end office tariff rates for services performed in connection with its provision of 8YY origination. But AT&T has refused to pay Teliax's tariffed rates for originating end office local switching and instead pays Teliax its national average *tandem* switching rate.[7] As a result, Teliax has sued AT&T in federal district court in Colorado.[8] Similarly, Peerless Network, Inc., whose operating subsidiaries are CLECs, offers end office local switching access service, including for "over the top" VoIP partners. Verizon, however, has refused to pay Peerless's

---

[6] *See, e.g., Connect America Fund, et al.,* Report and Order and Further Notice of Proposed Rulemaking, FCC 11-161, 26 FCC Rcd. 17,663 ¶¶ 1303-04 (2011) ("*Transformation Order*").

[7] *See* Letter from Robert Jackson, Counsel for Teliax, Inc., to Marlene H. Dortch, Secretary, FCC, WC Docket Nos. 16-363 & 14-228 (filed June 8, 2017).

[8] *See Teliax, Inc. v. AT&T*, 1:15-cv-01472-RBJ (D. Colo.).

tariffed end office switched access rate, arguing that the service provided by Peerless is not end office local switching.[9] Peerless has also sued and both matters have been referred to the Commission under the primary jurisdiction doctrine.[10]

CenturyLink believes the Commission should resolve this lingering issue through an open declaratory ruling proceeding, to allow for public comment. This is far preferable to a resolution through the Commission's complaint process, which under its rules restricts public participation.

II. THE APPLICABLE RULES AND THE REASONS FOR THEIR ADOPTION.

A. The Applicable Rules

47 C.F.R. 51.913(b)

> (b) Notwithstanding any other provision of the Commission's rules, a local exchange carrier shall be entitled to assess and collect the full Access Reciprocal Compensation charges prescribed by this subpart that are set forth in a local exchange carrier's interstate or intrastate tariff for the access services defined in §51.903 regardless of whether the local exchange carrier itself delivers such traffic to the called party's premises or delivers the call to the called party's premises via contractual or other arrangements with an affiliated or unaffiliated provider of interconnected VoIP service, as defined in 47 U.S.C. 153(25), or a non-interconnected VoIP service, as defined in 47 U.S.C. 153(36), that does not itself seek to collect Access Reciprocal Compensation charges prescribed by this subpart for that traffic. This rule does not permit a local exchange carrier to charge for functions not performed by the local exchange carrier itself or the affiliated or unaffiliated provider of interconnected VoIP service or non-interconnected VoIP service. For purposes of this provision, functions provided by a LEC as part of transmitting telecommunications between designated points using, in whole or in part, technology other than TDM transmission in a manner that is comparable to a service offered by a local exchange carrier constitutes the functional equivalent of the incumbent local exchange carrier access service.

---

[9] *See Peerless Network, Inc. v. MCI Communications Services, Inc., Verizon Services Corp., and Verizon Select Services, Inc.*, No. 14-cv-7417, 2018 WL 1378347, slip op. at 18 (N.D. Ill. Mar. 16, 2018).

[10] *Teliax*, 1:15-cv-01472-RBJ, 2017 WL 3839459, slip. op. at 2 (D. Colo. Sept. 1, 2017); *see also Peerless Network*, slip op. at 28-29.

47 C.F.R. 51.903

Definitions.

For the purposes of this subpart:

* * *

(d) End Office Access Service means:

(1) The switching of access traffic at the carrier's end office switch and the delivery to or from of such traffic to the called party's premises;

(2) The routing of interexchange telecommunications traffic to or from the called party's premises, either directly or via contractual or other arrangements with an affiliated or unaffiliated entity, regardless of the specific functions provided or facilities used; or

(3) Any functional equivalent of the incumbent local exchange carrier access service provided by a non-incumbent local exchange carrier. End Office Access Service rate elements for an incumbent local exchange carrier include the local switching rate elements specified in §69.106 of this chapter, the carrier common line rate elements specified in §69.154 of this chapter, and the intrastate rate elements for functionally equivalent access services. End Office Access Service rate elements for an incumbent local exchange carrier also include any rate elements assessed on local switching access minutes, including the information surcharge and residual rate elements. End office Access Service rate elements for a non-incumbent local exchange carrier include any functionally equivalent access service.

NOTE TO PARAGRAPH (d): For incumbent local exchange carriers, residual rate elements may include, for example, state Transport Interconnection Charges, Residual Interconnection Charges, and PICCs. For non-incumbent local exchange carriers, residual rate elements may include any functionally equivalent access service.

B. The Commission's Rationale for Adopting the Symmetry Rule.

When the Commission adopted 47 C.F.R. § 51.913 in 2011, it recognized that "the lack of clarity regarding the intercarrier compensation obligation for VoIP traffic has led to significant billing disputes and litigation."[11] In adopting the new rule, it noted that "[o]ur

[11] *Transformation Order* ¶ 937.

framework for VoIP-PSTN traffic will also reduce disputes and provide greater certainty to the industry regarding intercarrier compensation revenue streams while also reflecting the Commission's move away from the pre-existing, flawed intercarrier compensation regimes that have applied to traditional telephone service."[12]

Thus, the Commission concluded that, "[a]gainst this backdrop, and the fact that the current uncertainty and associated disputes are likely deterring innovation and introduction of new IP services to consumers, we find it appropriate to address the *prospective* intercarrier compensation obligations associated with VoIP-PSTN traffic." It also noted, "Indeed, despite the varied opinions in the record regarding the appropriate approach to VoIP-PSTN intercarrier compensation, there is widespread agreement that the Commission needed to act to address that issue now."[13]

In adopting the Symmetry rule, the Commission articulated several key principles embodied in the rule. First, structural symmetry was a key objective of the Commission:

> We agree with concerns raised by NCTA and find it appropriate to adopt a symmetrical framework for VoIP-PSTN traffic, under which providers that benefit from lower VoIP-PSTN rates when their end-user customers' traffic is terminated to other providers' end-user customers also are restricted to charging the lower VoIP-PSTN rates when other providers' traffic is terminated to their end-user customers. *We thus decline to adopt an asymmetric approach that would apply VoIP-specific rate for only IP-originated or only IP-terminated traffic.* . . . The Commission has recognized concerns about asymmetric payment associated with VoIP traffic today. . . .[14]

That is, the Commission's framework not only removed any doubt that LECs supporting VoIP service could collect intercarrier compensation in connection with VoIP-PSTN traffic, which carriers previously had varying degrees of success in collecting, but also simultaneously

---

[12] *Id.* ¶ 939.

[13] *Id*. (emphasis added).

[14] *Id.* ¶ 942 (emphasis added).

established that those same LECs' interexchange carrier affiliates (and any other interexchange carrier) would be required to pay intercarrier compensation for VoIP-PSTN traffic, which some IXCs had previously refused to pay.

Second, the Commission made clear that it was establishing new rules on a going-forward basis, and that it was not tied to the prior rules:

> Our intercarrier compensation framework for VoIP-PSTN traffic will apply prospectively, during the transition between existing intercarrier compensation rules and the new regulatory regime adopted by this Order [*i.e.*, bill-and-keep], and is subject to the reductions in intercarrier compensation rates required as part of that transition. We do not address preexisting law, including whether or how the ESP exemption might have applied previously, and we make clear that, whatever its possible relevance historically, the ESP exemption is not relevant or applicable prospectively in determining the intercarrier compensation obligations for VoIP-PSTN traffic.[15]

Thus, for all periods after 47 C.F.R. § 51.913 took effect, a LEC may collect end office local switching access charges for functions performed by the LEC or its VoIP partner that are the functional equivalent of end office local switching in a TDM environment.

Third, and finally, the Commission expressly adopted a technology-neutral, functional approach:

> Our transitional VoIP-PSTN intercarrier compensation rules focus specifically on whether the exchange of traffic occurs in TDM format (and not in IP format), without specifying the technology used to perform the functions subject to the associated intercarrier compensation charges ….Consequently, just as retail VoIP providers rely on wholesale carrier partners for, among other things, interconnection, access to numbers, and compliance with 911 obligations – a type of arrangement the Commission has endorsed in the past – so too do they rely on wholesale carrier partners to charge tariffed intercarrier compensation charges. Given these distinct circumstances, we adopt rules that permit a CLEC to charge the relevant intercarrier compensation for functions performed by it and/or by its retail VoIP provider, regardless of whether the functions performed or the technology used correspond precisely to those used under a traditional TDM architecture.[16]

---

[15] *Id.* ¶ 945.

[16] *Id.* ¶¶ 969-970.

The only limitation to this broad rule was to prevent double billing; the Commission made clear that a LEC could not charge for functions "performed neither by itself or its retail service provider partner."[17]

III. APPLICATION OF THE FUNCTIONAL EQUIVALENCE TEST FOR OVER-THE-TOP VOIP PROVIDERS PARTNERED WITH A LEC.

The functional equivalent of end office local switching is best determined with respect to the logical functions performed by an end office switch, as compared with a tandem switch, remote, or the SS7 network. This is clear in the text of the rule itself[18] as well as in the D.C. Circuit's decision in *AT&T v. FCC*.[19]

In the *2015 Declaratory Ruling*, the Commission determined that call control functions, including call set-up, supervision, and management, provided jointly by a LEC and its VoIP partner are the functional equivalent of the incumbent LEC's end office local switching in the TDM network, for which it assesses end office local switch charges pursuant to 47 C.F.R. § 69.106.[20] On review, though, the D.C. Circuit faulted the Commission for failing to distinguish clearly how these call control functions were unique to end office local switches, and not similar to functions performed by tandem switches or the SS7 network.[21] On that basis, it vacated and remanded the *2015 Declaratory Ruling*.

A more granular analysis of the functions performed by the end office local switch, though, shows that the Commission was fundamentally correct, and did not err, in focusing on

---

17 *Id.* ¶ 970.

18 *See* 47 C.F.R. § 51.903(d)(3).

19 *AT&T*, 841 F.3d at 1052-54.

20 *2015 Declaratory Ruling* ¶ 28.

21 *AT&T*, 841 F.3d at 1049.

the unique functions performed by the local switch with respect to call set-up and termination. These functions are different from the functions performed by a remote terminal, a tandem switch, or the SS7 network.

In a time division multiplexed circuit switched ("TDM") network, remote concentrators, end office local switches, and tandem switches are all computers and all move traffic from one set of lines to another, either aggregating or disaggregating traffic, depending on whether they are on the originating or terminating side of the call.[22] A remote concentrator, for example, moves traffic from a number of drop lines and concentrates it onto what is labelled a "feeder" line.[23] The local switch takes traffic from a number of feeder lines and concentrates that traffic further, sending it on lines labelled "trunks" to the tandem.[24] The tandem takes traffic from multiple switches and further concentrates it for transmission to interexchange carriers, or for routing to an end office switch for termination.[25] As this demonstrates, the act of concentrating traffic from smaller lines to larger lines is not a distinctive feature of the remote, local switch, or tandem switch. Each of these network elements performs these functions. Nor is the presence of a "switching matrix" that routes traffic from one circuit to another—as that is a feature of both an end office and a tandem switch. And, as discussed further in Section IV below, the labels applied to the circuits (such as "trunk", "line" or "feeder") are not descriptive of functions; they are conclusions.

What is distinctive about an end office switch, however, is its role in call set-up and take-down. Put simply, the end office switch is the network element that initiates the initial treatment

---

[22] Declaration of Adam Uzelac ("Uzelac Declaration") ¶ 5.

[23] *Id.*

[24] *Id.*

[25] *Id.*

of a call, which is then passed on to a tandem or the SS7 network, as applicable, and holds ultimate responsibility for any sessions originating to or from the end user.

Take, for example, the functions performed in a TDM network by each of the remote concentrator, local switch, tandem switch, and SS7 network when a caller picks up the handset and dials a number. For this call, the local switch is the device that notices the caller has picked up the line and that signals the network to generate a dialtone in confirmation of the caller's request to place a call.[26] The local switch is also the device that receives and initially processes the dialed or outpulsed digits to determine the network address to which the call will be routed.[27]

In contrast, the remote concentrator does not perform these functions.[28] The remote funnels traffic from the end user's handset to the upstream local switch, but does not inspect or process dialed digits to determine where to route the call.[29] Nor does the tandem perform these functions.[30] By the time traffic reaches the tandem, the dialed digits have already been collected and translated into a network destination address.[31] The tandem receives the already-addressed traffic and sends it on its way to the destination.[32] And the SS7 network only acts in reaction to the local switch.[33] Once the local switch receives the dialed digits, it signals the SS7 network to

---

26 *Id.* ¶ 6(a).

27 *Id.*

28 *Id.* ¶ 6(b). In fact, where a remote unit performs these basic switching functions, it is treated as an end office local switch for accounting purposes. *See Petitions for Reconsideration and Applications for Review of RAO 21*, Order on Reconsideration, 12 FCC Rcd. 10,061 ¶ 6 (1997) ("*RAO 21 Reconsideration Order*").

29 Uzelac Declaration ¶ 6(b).

30 *Id.* ¶ 6(c).

31 *Id.*

32 *Id.*

33 *Id.* ¶ 6 (d).

begin the process of setting up the call route, such as by notifying the tandem and interexchange switches to be ready to receive a call.[34] Critically, in a TDM network, the SS7 network never acts independently of the local switch—it only acts at the behest of the local switch.

These functions are also distinct on the terminating side of the call in a TDM network. The tandem switch receives the addressed traffic and sends it on to the end office local switch (which is the same device that would be the end office local switch if the called party were originating a call), which then transmits the call to its destination. If the call is answered, the end office local switch signals the SS7 network that an "answer" has occurred, and it monitors the line to see when the called party hangs up.[35] Neither the tandem switch nor the SS7 performs these functions.[36]

The cases cited by the D.C. Circuit do not establish anything to the contrary: indeed, they support the critical role of the end office local switch. In *Ameritech Operating Companies*, in the paragraph immediately following the paragraph cited by the court in *AT&T*, the Commission described the SS7 network's role in the call set-up process, making clear that the end office switch initiates call set-up via the SS7 network, and that the tandem switch receives the call set-up message and acts upon it, in some cases issuing further call set-up messages, but only in response to the message received from the initiating end office switch:

> A typical SS7 call set-up begins with an *end office* [Service Switching Point (SSP)] transmitting an initial address message (IAM) to a local [Signaling Transfer Point (STP)]. The IAM contains information about the call's destination, seeks to determine whether a transmission path is available to carry the call, and then instructs the network to begin establishing a transmission path. If the LEC network is establishing a direct transmission path between the end office and an IXC's switch, the SSP transmits an IAM through the STP to the IXC's SS7

---

[34] *Id.* ¶ 6 (d).

[35] *Id.* ¶ 7.

[36] *Id.*

> network. If the LEC network is establishing a tandem-switched transmission path between the end office and an IXC's switch, two steps are involved: (1) the SSP transmits an IAM through the STP to the *access tandem* switch to establish the transmission path between the end office and the access tandem switch; and (2) the access tandem switch transmits an IAM in return through the STP, which routes the message to the IXC's SS7 network to establish a transmission path between the access tandem switch and the IXC's switch. The process of transmitting IAMs to SSPs continues along the path of the telephone call until an IAM is transmitted to the terminating SSP serving the called party. The terminating SSP then returns an address complete message (ACM) notifying the preceding SSPs that all the address signals required to route the call to the called party have been received. If the called party answers the call, the terminating SSP will also return an answer message (ANM) notifying the preceding SSPs that the call has been answered.[37]

The Commission's description of the SS7 network in *In the Matter of High Cost Universal Service Support,* also cited by the D.C. Circuit, is entirely consistent with this description, with the end office switching initiating the transmission of call set-up messages through the SS7 network.[38]

---

[37] *Ameritech Operating Companies*, Order, 11 FCC Rcd. 3839, 3841 ¶ 5 (Common Carrier Bur. 1996). The terminating SSP is an end office SSP in an end-to-end TDM call.

[38] *In the Matter of High-Cost Universal Serv. Support; Fed.-State Joint Bd. on Universal Serv.; Lifeline & Link Up; Universal Serv. Contribution Methodology; Numbering Res. Optimization; Implementation of the Local Competition Provisions in the Telecommunications Act of 1996; Developing A Unified Intercarrier Comp. Regime; Intercarrier Comp. for ISP-Bound Traffic; IP-Enabled Servs.*, Order on Remand and Report and Order and Further Notice of Proposed Rulemaking, 24 FCC Rcd. 6475, 6642 ¶ 327 n.987 (2008) ("When a wireline LEC customer dials a call destined for an end user served by a different wireline LEC, the calling party's LEC determines, based on the dialed digits, that it cannot terminate the call. The SS7 call signaling system then begins the process of identifying a path that the call will take to reach the called party's network. SS7 identifies each service provider in the call path and provides each with the called party's telephone number and other information related to the call, including message type and nature of connection indicators, forward call indicators, calling party's category, and user service information if that information was correctly populated and not altered during the signaling process.") The other FCC decisions also cited by the court did not elucidate the role of the end office local switch in initiating SS7 call management messages in a TDM network. *See Access Charge Reform, Price Cap Performance Review for Local Exchange Carriers, Transport Rate Structure and Pricing, End User Common Line Charges*, First Report and Order, FCC 97-158, 12 FCC Rcd. 15,982, 16087 ¶ 244 (1997) ("*1997 Access Charge Reform Order*"); *Transformation Order* ¶¶ 708, 715-17.

Applying this analysis of the unique functions of an end office local switch in a TDM network to an IP network, the core functions of the end office local switch are performed by the LEC and/or its VoIP partner in the context of over-the-top VoIP.[39] These functions are *not* performed by the ISP that provides the internet connectivity over which an over-the-top VoIP call may ride.[40] The ISP may perform these functions in the context of facilities-based VoIP, where the VoIP provider and the network that operates the last-mile transmission facilities may be the same entity (*e.g.*, in some cases where a cable operator also provides VoIP service). Even in that case, however, these functions are performed by separate equipment owned by the last-mile provider. But for over-the-top VoIP, the ISP does nothing more than pass a stream of undifferentiated packets through its network.[41]

In the over-the-top VoIP context, the IP equivalent functionality of the core TDM end office functions described above—detecting off-hook, initiating call set-up, processing of dialed digits to determine the network address to which the call will be routed, directing of the SS7 network, monitoring answer supervision, providing an answer message and detecting call termination—are all performed by the VoIP provider and the LEC.[42] To begin with, the call session is initiated when the customer inputs the dialed digits of the called party into the VoIP application or device, which in turn contacts the VoIP provider's host server.[43] VoIP service is provided at the application layer, and thus the VoIP provider has the responsibility for managing and configuring the service; the ISP, on the other hand, simply provides transmission of packets,

---

39 Uzelac Declaration ¶ 8.

40 *Id.*

41 *Id.*

42 *Id.* ¶ 9.

43 *Id.*

including the application packets.[44] Once the VoIP provider's server receives the call invitation message, it extracts the phone number, determines the most appropriate route to the called party, and—in the case of a terminating point on the PSTN—re-packages the message and routes it to its LEC partner.[45] The LEC partner in turn performs the other equivalents to end office local switching functions, such as determining the endpoint address on the PSTN and initiating SS7 messages for the remainder of the call set-up.[46]

As in the TDM context described above, each of these IP network functions is replicated in the other direction on terminating end of the call where a PSTN-originated call is destined for a called party that is a VoIP customer.[47] Here, the originating carrier on the PSTN generates an SS7 message that directs the call to the LEC partner using the traditional TDM functionality described above. Once the call reaches the LEC in TDM form, it is converted to IP and delivered to the VoIP provider's host server and then to the called party's VoIP application or device.[48] At the terminating end, the VoIP provider and LEC partner perform the equivalent functions to monitoring the called party's line to see if the called party answers, providing an answer message, and detecting call termination.[49]

These end office core functions, as described above, are not performed by the tandem switch in a TDM network.[50] Therefore it must also be the case that, for VoIP calls in an IP

---

44 *Id.*

45 *Id.*

46 *Id.*

47 *Id.* ¶ 10.

48 *Id.*

49 *Id.*

50 *Id.* ¶ 11.

network, the element of the network that performs such functions is not the functional equivalent of a tandem switch.[51] Rather, it is the functional equivalent of an end office local switch.[52]

This analysis answers the core critique of the *2015 Declaratory Ruling* in *AT&T*[53] in which the court held that the Commission had not adequately explained "why the activities of over-the top VoIP-LECs should be classified as end-office rather than tandem switching."[54]

A passage of dicta in the court's opinion relating to the *Transformation Order* bears further discussion. AT&T, as it had before the Commission, argued that the *Transformation Order* and other Commission decisions *precluded* the application of end office switching charges to over-the-top VoIP traffic. The court rejected AT&T's argument, but in doing so, selectively quoted portions of paragraph 969 that made clear that (i) carriers that use IP facilities to transmit traffic to or from the end user's premises may collect end office access reciprocal compensation charges and (ii) that carriers may not charge for functions performed neither by themselves or their VoIP partners.[55] The court indicated that such language, in isolation, could be read as consistent with the view that LECs could not charge for over-the-top traffic delivered to unrelated ISPs, but also said it could plausibly be read not to preclude such charges.[56]

While even on its own terms, the court's dicta in this regard is not helpful to AT&T's position, a close reading of the entirety of paragraph 969 makes clear that the Commission

---

51 *Id.*

52 *Id.*

53 *AT&T*, 841 F.3d at 1049.

54 *Id.* at 1052; *see also id.* at 1054.

55 *Id.* at 1054.

56 *Id.*

rejected AT&T's suggestion that "over-the-top" VoIP should be excluded.[57] By making no technological distinctions, the Commission deliberately did not limit the scope of end office access reciprocal compensation based on the technology used to perform relevant functions or who provided last-mile transmission, but instead took a much more expansive view of functional equivalence:

> Our transitional VoIP-PSTN intercarrier compensation rules focus specifically on whether the exchange of traffic occurs in TDM format (and not in IP format), without specifying the technology used to perform the functions subject to the associated intercarrier compensation charges. We thus adopt rules making clear that origination and termination charges may be imposed under our transitional intercarrier compensation framework, including when an entity 'uses Internet Protocol facilities to transmit such traffic to [or from] the called party's premises.'[58]

Similarly, in this section of paragraph 969, the Commission did not limit the scope of end office access only to the transmission of traffic to or from the called party's premises, but gave it as one example of when origination and termination charges may be imposed. Rather, the *Transformation Order* contemplated a functional analysis not tied to a specific technology, which is precisely what we have laid out above.

This analysis also best squares with the Commission's stated objectives in its statement of basis and purpose in the *Transformation Order* regarding establishing a set of clear,

---

[57] *See* Letter from Robert Quinn, AT&T, to Marlene H. Dortch, Secretary, FCC, CC Docket No. 01-92, WC Docket No. 07-135, & GN Docket No. 09-51, at 2-3 (filed Oct. 21, 2011). In that same letter, AT&T argued that the Commission should expressly limit any new rule to apply only to facilities-based VoIP and not over-the-top VoIP, *id*. at 6 n.24, something the Commission declined to do. Tellingly, however, AT&T acknowledged that VoIP providers "perform functions analogous to end office switching and other associated access services," before concluding that VoIP providers, because they are not LECs, cannot collect switched access charges. *Id.* at 3 n.9. But when the Commission adopted the *Transformation Order*, it created a regime under which a LEC partnered with a VoIP provider that performs the functional equivalent of end office switching *can* collect end office switching access compensation. *Transformation Order* ¶ 969.

[58] *Transformation Order* ¶ 969.

prospective rules that minimized litigation.[59] As a real world example of how this analysis leads to greater certainty, take the fact that VoIP systems frequently allow calls to be placed or received not only from a person's workplace, but also at other locations reached "over-the-top," such as a person's home when telecommuting. Because the same electronics provide core local switching functions for calls originated or terminated over a VoIP provider's own facilities (*e.g.*, traditional cable telephony) as well for calls originated or terminated for the VoIP provider's customers when reached "over-the-top", there is no way to identify and track which calls to that telephone number traversed the provider's own last mile to the enterprise, and which traversed an over-the-top last mile. Attempting to enforce such a distinction—which is what allowing end office local switching charges only for facilities-based VoIP, and not for over-the-top VoIP, would do—creates complexity and invites disputes and litigation. Moreover, such an approach would not be technologically neutral, but instead would tie compensation to specific technologies used to perform call delivery—precisely what the Commission wanted to avoid.[60]

IV. REFERENCING "TRUNKS" AND "LOOPS" IS A CIRCULAR AND AN INCOHERENT BASIS FOR FUNCTIONAL EQUIVALENCE DETERMINATIONS.

Both prior to and in its challenge to the *2015 Declaratory Ruling*, AT&T argued that the core function of an end office local switch is to connect "trunks" to "loops."[61] But this argument results in a definition of "end office switching" that is both incorrect and entirely circular.

---

59 *Transformation Order* ¶ 939 (stating that the Commission wanted to "reduce dispute and provide greater certainty to the industry regarding intercarrier compensation revenue streams").

60 *See Transformation Order* ¶¶ 969-970.

61 *See, e.g.*, Letter from David Lawson, Attorney for AT&T Corp., to Marlene H. Dortch, Secretary, FCC, CC Docket No. 96-45, CC Docket No. 01-92, WC Docket Nos. 03-109, 05-337, 07-135 & 10-90, GN Docket No. 09-51 (Jan. 17, 2013) ("Jan. 17, 2013 AT&T Ex Parte").

First, the distinction between a trunk and a loop is not self-evident as a matter of network architecture, as there are several different points in a network that aggregate traffic from smaller connections onto larger ones, or vice versa. As noted above, this function is performed by electronics classified as remote concentrators, end office switches, tandem switches, and even by higher level interexchange switches. Indeed, it was the growing use of equipment like remote concentrators—and uncertainty regarding how such equipment should be accounted for—that led to the issuance of Revised RAO Letter 21, which explained how to distinguish remote switches from remote concentrators.[62] Thus physical interconnection of transmission facilities being aggregated or disaggregated cannot by itself be the *sine qua non* of distinguishing an end office switch from other routing facilities that aggregate traffic.

Second, although in a TDM network, a switch always contains a switching matrix to connect one circuit with another and to switch traffic between different circuits, the presence of a "switching matrix" itself does not distinguish the end office from the tandem switch.[63] Both have circuits connected to them and can route traffic onto the various connected circuits. A switching matrix, in and of itself, cannot therefore define the core functionality of an end office switch as distinguished from a tandem switch.

Third, if the designation of a piece of equipment as an end office switch depends on identifying the trunk and the loop, and the trunk and the loop themselves are defined with respect to the placement of the equipment called the local end office switch, the result is a circular

---

62 *Revised RAO Letter 21*, 7 FCC Rcd. 6075 (1992).

63 In *RAO 21 Reconsideration Order* ¶¶ 11-12, the Commission did find a "switch matrix" to be an essential element for distinguishing a switch from "circuit equipment." That that does not establish the switching matrix as a basis for distinguishing a tandem from an end office. It was also confined by the then-current technology, which was entirely TDM, and thus does not elucidate what functions in an IP network are uniquely equivalent to a TDM end office switch.

definition that has no coherence. AT&T's argument that one must classify each line entering a particular piece of electronic routing equipment as a "trunk" or a "loop" fails logically where the classification of lines depends on whether the particular piece of electronic routing equipment is designated as an end office switch, and the designation of the equipment as an end office switch depends on the classification of the lines.

Although the traditional TDM network definition of a loop was the connection between the end user premises and the ILEC central office (as the pre-*Transformation-Order YMax I* decision illustrated),[64] that taxonomy does not work in evaluating the functions performed on a modern network. The Commission itself recognized this in the *2015 Declaratory Ruling*[65] and it is equally clear in the language of 47 C.F.R. 903(d)(3), which requires an examination of the "functional equivalent of the incumbent local exchange carrier access service provided by a non-incumbent local exchange carrier" specifically with reference to the functions covered by 47 C.F.R. § 69.106 (local switching). In a modern network, assigning one piece of routing equipment the name "end office switch" and using that to define network functions clarifies nothing; worse, it conflates the *functionality* of local switching with the *equipment and technology* used to provide that functionality—which would contravene the Commission's technology-neutral approach in the *Transformation Order*. The result would be that no party will fully understand what charges each may assess and why.

---

64 *See YMax I* ¶¶ 15-34 (denying YMax the right to assess Switched Access Service Charges because its tariff inaccurately defined those charges as related to services provided by means of a local loop, which it did not offer, rather than with reference to the functions it provided that were the equivalent of services provided by means of a local loop); *see also id.* ¶ 14 n.55 ("We express no view about whether or to what extent YMax's functions, *if accurately described in a tariff*, would provide a lawful basis for any charges." (emphasis added)).

65 *2015 Declaratory Ruling* ¶ 27 (explaining that a test based on "physical functions" is too "constricted[and] narrow" an interpretation of the *Transformation Order*).

Rather than accepting AT&T's loop-to-trunk connectivity argument, the more logical and analytically sound route is to distinguish the functions that differentiate each piece of routing equipment uniquely from the others. Traffic aggregation does not do so. Focusing on unique functionality leads us to the analysis set out in Section III above—namely, that where a LEC and its VoIP partner perform the unique functions of the electronics called the end office local switch that are *not* performed by either tandem switches or remote concentrators, regardless of the kind of equipment or technology used to perform those functions, they may assess end office local switching access charges.

V. END OFFICE LOCAL SWITCHING CHARGES ARE NOT PART OF LOOP COST RECOVERY OR TIED TO THE SIZE OF THE GEOGRAPHIC AREA SERVED.

In the proceeding leading to the *2015 Declaratory Ruling*, AT&T also argued that end office local switching should not apply to "over-the-top" calls because end office local switching recovered the costs of providing local loops, and of operating local switches that served relatively small geographic areas.[66] This is plainly incorrect. In fact, the function on which AT&T fixated most directly—the connection to a loop—is not a function compensated through end office switching charges at all. That function, including the line port used to connect the switch to the loop, is compensated under the Part 69 rules governing ILEC access charges by the common line rate elements.[67] By contrast, call set-up is unambiguously a function of the end

---

66 *See, e.g.*, Jan. 17, 2013 AT&T Ex Parte at 5-6, 14.

67 *See* Letter from John T. Nakahata to Marlene H. Dortch, Secretary, FCC, WC Docket Nos. 10-90 & 05-337, GN Docket No. 09-51, & CC Docket Nos. 01-92 & 96-45, at 3 & n.3 (filed Apr. 15, 2013) ("Apr. 15, 2013 Level 3 Ex Parte"). These elements are the End User Common Line Charge (or Subscriber Line Charge) set forth in 47 C.F.R. §§ 69.104 and 69.152, Presubscribed Interexchange Carrier Charge set forth in 47 § 69.153, and the Carrier Common Line Charge set forth in §§ 69.105 and 69.154. Other than the End User Common Line Charge, these charges have been largely supplanted by the Access Recovery Charge and, to the extent applicable, Access Recovery Connect America Fund support.

office local switch, as set forth in 47 C.F.R. § 69.106. And it is a function that is provided by a LEC and its over-the-top VoIP partner.

A. Under Part 69 Access Rules, End Office Local Switching Does Not Recover Loop or Port Charges.

Section 69.106 of the Commission's rules governs end office local switching charges in the ILEC network. Section 69.106 does *not* cover loop transmission, remote terminal functionalities, or line ports. Instead, it covers the switching function, call set-up and, when used, a common or dedicated trunk port. Thus only those functions that fall within the scope of Section 69.106 are relevant to the analysis of functional equivalence under the Symmetry Rule.

Prior to the *Transformation Order*, loop costs (including the line port connecting the loop to the switch) were recovered, to the extent not recovered in end user charges, through the Carrier Common Line Charge, set forth in Section 69.154 (and formerly Section 69.104[68]). When the Commission adopted Section 51.903(d)(3), its definition of "end office access service" distinguished between local switching rate elements in Section 69.106 and carrier common line rate elements in Section 69.154. That is, the Commission made clear that these two sets of rate elements are distinct, and that local switching charges are not the same as carrier common line charges.

AT&T argues that end office local switching charges cannot be assessed where the provider does not offer a connection to a local loop—arguing, in effect, that local switching charges may be assessed for such things as loop transmission, remote terminal functionalities, and line ports. But this conclusion cannot be reconciled with the rules. As part of its 1997

---

[68] Note that Section 69.104 is no longer relevant because those Carrier Common Line charges were incorporated in the Access Recovery mechanisms, including the ARC and Access Replacement Connect America Fund support.

reform of access charges, the Commission concluded that the "[Non-Traffic Sensitive] costs associated with line ports will no longer be included in the local switching charge," but would instead be recovered through common line charges.[69] As such, charges for the connection between the switch and the loop, including the line-card, protector and Main Distribution Frame, are not governed by Section 69.106, which defines the scope of the functional equivalence requirement set out in Section 51.903(d)(3).[70]

B. There Is No Limitation on LEC End Office Local Switching Charges Based on the Size of the Geographic Area Served by the Switch.

Similarly, AT&T argues that end office local switch charges are assessed on the basis of the size of the geographic area served by the switch, and that only those LECs that have built facilities to serve small geographic areas should be able to recoup those costs via end office local switching access charges. AT&T appears to believe that any other conclusion would render a LEC a free-rider.[71]

This, too, cannot be reconciled with the rules—or with the way access reciprocal compensation works in practice. A LEC's ability to assess end office access charges has never been geographically limited; thus a LEC using TDM can serve an entire multistate region from a

---

[69] *See 1997 Access Charge Reform Order* ¶ 62; *Multi-Association Group (MAG) Plan for Regulation of Interstate Services of Non-Price Cap Incumbent Local Exchange Carriers and Interexchange Carriers*, Second Report and Order and Further Notice of Proposed Rulemaking, *Federal-State Joint Board on Universal Service*, Fifteenth Report and Order, *Access Charge Reform for Incumbent Local Exchange Carriers Subject to Rate-of-Return Regulation*, *Prescribing the Authorized Rate of Return From Interstate Services of Local Exchange Carriers*, Report and Order, FCC 01-304, 16 FCC Rcd. 19,613, ¶¶ 90-91 (2001) (moving recovery of line ports to common line for rate-of-return carriers).

[70] *1997 Access Charge Reform Order* ¶ 125.

[71] Jan. 17, 2013 AT&T Ex Parte at 4, 14.

single switch, and tariff and collect end office local switching access charges.[72] Constraining a LEC's ability to assess end office access charges only to where the LEC has built its switch to serve a small geographic area would be entirely inconsistent with the *Transformation Order* itself, in which the Commission stated that the purpose of the Symmetry Rule was to adopt a technologically neutral approach that would encourage investment in and transition to IP networks,[73] including not only last-mile Internet access facilities but, more critically, IP voice infrastructure capable of handling call set-up, routing, transport, interconnection, and traffic exchange.[74]

---

[72] Indeed, in 1995, Pacific Telesis, which was later bought by SBC and is now part of AT&T itself, averaged more than 19,000 end user lines per local switch, and more than 18,000 lines per "switching entity." *See* Jonathan M. Kraushaar, Industry Analysis Division, FCC, *Infrastructure of the Local Operating Companies Aggregated to the Holding Company Level, 1991-1995*, at 4, 15 (1997), *available at* https://apps.fcc.gov/edocs_public/attachmatch/DOC-334337A1.pdf.

[73] *Transformation Order* ¶¶ 969-970.

[74] *See* Apr. 15, 2013 Level 3 Ex Parte at 1.

CONCLUSION

Accordingly, CenturyLink petitions the Commission to resolve the ongoing uncertainty with respect to the applicability of access reciprocal compensation charges on traffic to or from an over-the-top VoIP end user by making clear that such charges apply when the LEC or its VoIP partner provides the unique functions of an end office switch, which are the functions of originating calls and monitoring calls for termination, and initiating call set-up and take down.

Respectfully Submitted,

CENTURYLINK
Timothy M. Boucher
Suite 120
931 14th Street
Denver, CO 80202
303-992-5751
Timothy.Boucher@CenturyLink.com

Joseph Cavender
Suite 250
1099 New York Avenue, N.W.
Washington, D.C. 20001
571-730-6533
Joseph.Cavender@CenturyLink.com

John T. Nakahata
Kristine Laudadio Devine
HARRIS, WILTSHIRE & GRANNIS LLP
1919 M Street, NW
The Eighth Floor
Washington, DC 20036
(202) 730-1300
jnakahata@hwglaw.com

May 11, 2018

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of:	)	
	)	
Connect America Fund	)	WC Docket No. 10-90
	)	
Developing a Unified Intercarrier Compensation Regime	)	CC Docket No. 01-92
	)	

DECLARATION OF ADAM UZELAC

1. My name is Adam Uzelac and I am Principal Network Architect at CenturyLink. I have held this position for either CenturyLink or Level 3 Communications, LLC since 2012. Prior to joining Level 3, I worked at Global Crossing as the Director of Network Architecture and Engineering. Before that, I held positions in engineering at Frontier.

2. This declaration is intended to support the Petition for Declaratory Ruling filed by CenturyLink regarding the application of Section 51.913 of the Commission's Rules. I am familiar with the technical aspects of the petition as well as with the Commission's prior orders regarding the relevant rule.

3. The key issue raised in CenturyLink's petition is what constitutes the functional equivalent of end office local switching, for which an incumbent LEC assesses a charge pursuant to Section 69.106 of the Commission's rules, when a LEC partners with an over-the-top VoIP provider that exchanges traffic with the Public Switched Telephone Network ("PSTN").

4. In its 2015 order, FCC 15-14, the Commission determined that call control functions, including call set-up, supervision, and management provided jointly by a LEC and its VoIP partner are the functional equivalent of end office local switching in a time division multiplexed circuit switched ("TDM") network. This conclusion correctly recognized these core

functions of the end office local switch. Though, as the D.C. Circuit noted, all switches perform functions related to call set up and control, the end office local switch performs specific and unique functions that are not replicated by remotes, tandems, or the SS7 network.

5. The relevant routing devices in a TDM network, including remote concentrators end office local switches, and tandem switches, are all computers in a TDM network. All of these elements move traffic from one set of lines to another, either aggregating or disaggregating traffic, depending on which side of the call (i.e., originating or terminating) the switch is located. Thus, a remote concentrator takes traffic from a number of drop lines and concentrates that traffic onto a feeder line; a local switch takes traffic from a number of feeder lines and concentrates them further before sending them to the tandem switch; and a tandem switch takes traffic from multiple local switches and further concentrates it for transmission to interexchange carriers (or long distance calls) or for routing to a local end office switch for termination.

6. Beyond that articulation of the general functions of switches and concentrators, however, each of those routing devices performs different functions in the process of moving that traffic. Thus, in a TDM network, when a caller picks up a handset and dials a number, each of the remote concentrator, end office and tandem switches, and the SS7 network play different roles in originating that call.

a. The end office local switch is the device that notices that the caller has picked up the handset and that signals the network the desire to place a call, to which the network plays out a dial tone in confirmation of the request. The end office local switch also receives and initially processes the dialed/outpulsed digits to determine where and how to forward or "route" the call. When toll traffic transits this switch on an incumbent

LEC's network, it is subject to the charges prescribed in Section 64.106 of the Commission's rules, provided the LEC has filed an appropriate tariff.

b. In contrast, the remote concentrator does not perform these functions. Rather, the remote concentrator funnels traffic from the end user's handset to the upstream end office local switch. It does not inspect or process dialed digits in order to determine where to forward or route the call.

c. Nor does the tandem signal the network to generate dial tone or process dialed digits. By the time call traffic has reached the tandem, the dialed digits have already been collected and translated into a network destination address. The tandem receives the addressed traffic and sends it on to its destination.

d. Similarly, the SS7 network does not act independently of the end office local switch. Rather, in a TDM network, the SS7 network acts at the request of the end office local switch. Once the local switch receives the dialed digits, it signals the SS7 network to begin the process of setting up the actual call path—which the SS7 network does using the information provided by the end office local switch.

7. Each of these TDM network functions is replicated in the other direction on the terminating end of the call. At the terminating end, the tandem switch receives the addressed traffic and sends it on to the end office switch that transmits the call its destination. The end office local switch typically monitors the called party's line to determine if the called party answers, and, if the call is answered, signals the SS7 network that the call has been answered while also monitoring the line to see when the called party hangs up. Neither the tandem switch nor the SS7 network performs these functions.

8. In an IP network, where a VoIP provider offers "over the top" service and has partnered with a LEC to interconnect and exchange traffic with the PSTN, these core "end office" functions described above are all provided by the over-the-top VoIP provider and its LEC partner—in combination. These functions are *not* performed by the ISP that provides the internet connectivity over which an over-the-top VoIP call may ride. That may be the case in the context of "facilities-based" VoIP, such as where the VoIP provider and the network that operates the last-mile transmission facilities are the same entity (*e.g.*, where a cable operator also provides VoIP service). Even in that case, though, these functions are performed by separate equipment owned by the last-mile provider and attached to the network of the last-mile provider. But for over-the-top VoIP, the ISP typically does nothing more than pass a stream of undifferentiated packets through its network.

9. In the over-the-top VoIP context, the IP equivalent functionality of the core TDM end office functions described above—detecting off-hook, initiating call set-up, processing of dialed digits to determine the network address to which the call will be routed, directing of the SS7 network, monitoring answer supervision, providing an answer message and detecting call termination—are all performed by the VoIP provider and its partner LEC. Specifically, where an over-the-top-VoIP-originated call is destined for a called party on the PSTN, the call session is initiated when the customer inputs the dialed digits of the called party into the customer premises VoIP device or application. The device or application, in turn, contacts the VoIP provider's host server using the server's Uniform Resource Locator, or URL. The VoIP provider provides VoIP service at the application layer, and thus has the responsibility for managing and configuring the VoIP service. The ISP simply provides the transmission of packets on which the application rides. Once the VoIP provider's VoIP server receives the call invitation message, the VoIP

provider extracts the telephone number and determines the most appropriate route to the called party. In the case of a call where the called party is located on the PSTN and goes through a LEC partner (the type of calls at issue here), the VoIP provider's VoIP server re-packages the message payload and routes it to its LEC partner. The LEC partner then performs the other equivalents to the core end office steps described above—for example, determining the endpoint address on the PSTN for the call at issue and initiating the SS7 messages to set up the remainder of the call.

10. Each of these IP network functions is replicated in the other direction on the terminating end of the call—*i.e.*, where a PSTN-originated call is destined for a called party that is a customer of the over-the-top VoIP provider. In these instances, the originating carrier on the PSTN generates an SS7 message that directs the call to the LEC partner over the traditional TDM network functionality described above. Once the call reaches the LEC in TDM form, it is converted to IP and delivered to the VoIP provider's host server and, in turn, to the customer's VoIP application at the customer's location. In this call flow, the VoIP provider/LEC partner in combination perform the equivalent of monitoring the called party's line to determine if the called party answers, providing an answer message, and detecting call termination. Specifically, the VoIP provider's server, in this context, receives the call invitation and, based on the state of the customer's VoIP application (*e.g.*, ready, offline or busy), reacts accordingly (*e.g.*, ring, send to voicemail, etc.). Other call termination functionality varies based on the type of device or application the customer is using but, in all cases, that functionality is provided by the VoIP provider, or by the customer that has received the call.

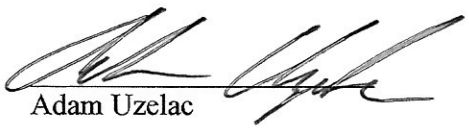
11. As was demonstrated in Paragraph 6, above, the end office core functions described in Paragraph 10 are not performed by the tandem switch in a TDM network. The same

is true for VoIP calls in an IP network. Thus, the element of the IP network that performs such functions is not the functional equivalent of a tandem switch (though LEC partners/VoIP providers may, in some cases, also perform tandem functions). Rather, it is the functional equivalent of an end office local switch.

[Remainder of page left intentionally blank]

I declare under penalty of perjury that the foregoing is true and correct.

Executed on May 11, 2018



Adam Uzelac