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BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, Complainant, v. CENTURYLINK COMMUNICATIONS, LLC, Respondent.	DOCKET NO.: UT-181051

RESPONSE TESTIMONY

OF

MARTIN D. VALENCE

ON BEHALF OF

CENTURYLINK COMMUNICATIONS, LLC

March 31, 2022

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I. BACKGROUND AND SUMMARY OF TESTIMONY

Q. PLEASE STATE YOUR NAME AND SUMMARIZE YOUR CURRENT ROLE AT LUMEN.

A. My name is Martin D. Valence. I am the Vice President, Network Operations, for CenturyLink. In this role (which I have held since November 2017), I oversee a team of leaders and engineers/technical professionals focused on the company's global network infrastructure, including IP, Ethernet, Transport, Voice and Public Safety services.

Q. PLEASE DESCRIBE YOUR EDUCATION.

A. I hold a Bachelor of Arts in Political Science from the University of Florida (1989), and a Masters of Public Administration from Ohio State University (1994). I also served in the Marine Corps for 11 years (1984-1995). During that time, I was a forward observer (serving in Operation Desert Storm), platoon commander, and later an officer overseeing recruiting operations in Columbus, Ohio and Cincinnati, Ohio.

Q. PLEASE SUMMARIZE YOUR WORK EXPERIENCE AT LUMEN AND ITS PREDECESSORS.

A. I have been an employee of Lumen and its predecessor companies for nearly 20 years. From 2002 to 2009, I served as a Staff Program Manager in the company's Service Delivery & Network Operation Support Department. In that role, I focused on the company's operational support systems ("OSS") program and vendor management issues, including program analyses, budgeting, and OSS improvement initiatives. From 2009-2011, I served as Manager, Program/Project Management in the company's Network Operation Support Department. In that role, I directed the activities of the operations

support team responsible for providing process and project support to production units of the National Network Services Service Delivery line of business. From 2011-2014, I served as Director, Ethernet & DSL Network Reliability Centers. In that role, I led a team of network professionals providing service provisioning, network management and technical support to company Ethernet, ATM-Frame Relay, and high-speed internet/IP television networks. From 2015-2017, I served as Director, Global Network Event Management and Public Safety Services. In that role, I led a team of professionals specializing in public safety services (911) and network management. My key responsibilities included developing operational strategies to position CenturyLink to meet evolving federal public safety requirements and cost structure alignment goals and leading operational transition to a next generation IP-based public safety services operation.

Q. HAVE YOU TESTIFIED BEFORE THIS COMMISSION OR ANY OTHER REGULATORY OR JUDICIAL BODY?

A. I have spoken to both the Nebraska and Arizona Commissions on behalf of CenturyLink, but neither required formal pre-filed written testimony. Those opportunities were engagements where I was made available to answer questions from the Commissioners.

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. My testimony focuses on three primary points.

First, the completion of 911 calls during the December 2018 network event had very different impacts on the 15 PSAPs served by CenturyLink than on the 47 PSAPs served by Comtech. Calls destined for the PSAPs served by CenturyLink were unaffected by the network event, while some calls destined for Comtech's PSAPs failed as a result of the

network event. The difference between the two carriers was network design. CenturyLink ensured the signaling links supporting its 911 calling were provisioned with supplier diversity; as a result, none of the calls failed as a result of the outage. In contrast, all four of Comtech's SS7 signaling links were provisioned on the Infinera Green network—something Comtech knew created the potential for problems, and something Comtech kept hidden from everyone else. Had Comtech communicated this fact to CenturyLink, CenturyLink could have ensured the signaling links were provisioned on diverse networks, which would have eliminated the problem that caused the failed calls altogether.

Second and relatedly, CenturyLink's ordering process gives carriers the ability to ask that circuits be provisioned with network diversity. All Comtech needed to do was check a box, and pay a bit more money. Comtech opted to save the money and run the risk. This left CenturyLink in the dark. CenturyLink had no idea that the circuits ordered would be used for SS7 signaling, let alone SS7 signaling to support 911 calling.

Third, Staff witness Mr. Webber states that a packet storm experienced on the Red Infinera network in February 2018 should have led CenturyLink to close a management channel on its entirely separate Green Infinera network. On this point, Infinera's technical lead, Thomas McNealy, and I agree. There are no meaningful similarities between the outage on the Red Network and the outage on the Green network. [redacted]

[redacted] To claim that CenturyLink is financially responsible under these circumstances is frankly absurd, especially when the true cause of the outage was Comtech's network design—a design Comtech knew all along was faulty and ignored it nonetheless.

II. LUMEN'S OPTICAL NETWORKS

Q. HOW MANY DIFFERENT OPTICAL NETWORKS DOES CENTURYLINK HAVE?

A. In addition to its TDM networks, CenturyLink has six separate, stand-alone optical networks, including the "Infinera Green" network (legacy CenturyLink) and the "Infinera Red" network (legacy Level 3).

Q. DO THESE OPTICAL NETWORKS OVERLAP, MEANING DO MULTIPLE OPTICAL NETWORKS SERVE THE SAME GEOGRAPHIC AREAS?

A. Yes, the six networks do geographically overlap. CenturyLink understands that there are times when it is important to have redundant services on separate networks. Overlapping networks allow CenturyLink to create supplier diversity without having to go outside of the CenturyLink family of companies.

Q. IN TESTIMONY IN THIS PROCEEDING, WHAT DOES PUBLIC COUNSEL ASSUME ABOUT THE NUMBER OF OPTICAL NETWORKS DEPLOYED BY CENTURYLINK?

A. Public Counsel's witness, Mr. Brian Rosen, appears to assume that CenturyLink has only one optical network. He says "CenturyLink built its optical network using multiple

optical network switches supplied by one vendor, Infinera Corporation. Had CenturyLink deployed two vendors, the nationwide failure that impacted Washington's 9-1-1 system either would not have happened, or the scope and duration of the failure would have been Reduced dramatically."[1] That Lumen has multiple optical networks demonstrates that it is not reliant upon a single vendor. That way even if one optical network fails, the other networks should ensure that calls still complete.

Indeed, on the very same page of his testimony, Mr. Rosen states "I believe the failure occurred because all four links used the same optical network. In building 9-1-1 systems, I generally advise that supplier diversity be used to guard against the kind of failure that occurred here. In this case, there was no supplier diversity."[2] As will be explained below, with its multiple optical networks and separate TDM network, CenturyLink could have provided Comtech with supplier/network diversity had Comtech just informed CenturyLink that the circuits in question were to be used for signaling links to support 911 calling and that diversity was required.

III. SUPPLIER DIVERSITY

Q. IN CENTURYLINK'S PROVISION OF 911 SERVICE TO THE 15 REMAINING PSAPS IT WAS RESPONSBILE FOR IN DECEMBER 2018, DID CLC USE SEPARATE NETWORKS TO CREATE SUPPLIER DIVERSITY FOR THE SIGNALING LINKS USED TO SUPPORT ITS 911 NETWORK?

A. Yes, it certainly did and this is exactly the point to be understood. CLC [redacted]

[1] Direct Testimony of Brian Rosen (Dec. 15, 2020), Exh. BR-1CT ("Rosen Direct"), at 20.

[2] Rosen Direct, at 20-21.

[redacted]. In other words, CLC did the very thing Mr. Rosen recommended; it used supplier diversity to "guard against" a network outage on one of the networks.[3]

Q. BECAUSE CENTURYLINK USED SUPPLIER DIVERSITY TO PROVISION SIGNALING TO SUPPORT 911 SERVICES TO ITS 15 PSAPS, HOW DID THE OUTAGE ON THE INFINERA GREEN NETWORK IMPACT CENTURYLINK'S ABILITY TO DELIVER 911 CALLS IN WASHINGTON IN DECEMBER 2018?

A. It did not impact CLC's ability to complete 911 calls in the state of Washington. I realize that Staff's witness, Mr. Webber, states that a small number of 911 calls destined for the 15 CenturyLink-served PSAPs did not complete due to the network event. However, this is incorrect, as Mr. Klein explains in his Response Testimony.[4] While some calls did not complete for various reasons such as the caller hung up, none failed to complete due to the network outage on the Infinera Green network. Again, CenturyLink utilized route diversity for its own signaling links; while such prudent network design was available to Comtech, it chose not to avail itself of this industry recommended practice. CLC witness Steven Turner explains Comtech's failure to provision signaling links using route diversity, the likely reasons leading to that decision (cost savings), and the ultimate breakdown of the Comtech 911 network as a result of Comtech's flawed design

[3] CLC informed all parties of the diversity of its SS7 links in a November 2021 discovery response. Yet, Mr. Rosen makes no mention of that information. See Exhibit MDV-2C, CLC Response to Staff DR 27c.

[4] Response Testimony of Carl D. Klein, at 11-12.

decisions.[5]

Q. IF COMTECH HAD ASKED CENTURYLINK TO PROVIDE SIGNALING LINKS ON DIFFERENT NETWORKS, WOULD CENTURYLINK HAVE BEEN ABLE TO DO SO?

A. Absolutely. CenturyLink had capacity on different networks that would have allowed CenturyLink to provision signaling links to Comtech over unique networks for completion of 911 calls in the state of Washington.

Q. DID COMTECH EVER MAKE CENTURYLINK AWARE THAT IT LACKED SUPPLIER DIVERSITY ON THE SIGNALING LINKS IT USED TO SUPPORT 911 CALLS IN WASHINGTON?

A. No. Indeed, Comtech admits that it never informed CenturyLink of this fact even though Comtech knew its SS7 links should be provisioned using supplier diversity. Comtech's response to discovery requests in this instance is telling. First, Comtech states that it "seeks supplier diversity as a matter of practice."[6] Comtech continues that "supplier diversity is a generally good practice, if available, based on the significant expertise of its employees and general industry guidance, such as the National Emergency Number Association ("NENA") i3 materials", which state "multiple circuits from multiple providers is assumed to create greater diversity and Redundancy."[7]

Comtech stated that it did not obtain supplier diversity because [redacted]

[5] CenturyLink has also confirmed that its vendor, Intrado, provisioned SS7 links using supplier diversity for the SS7 links that connected the Intrado STP and the Comtech/TNS STP. The weak link in the proverbial diversity chain was Comtech.

[6] See Response Testimony of Stacy Hartman, Exhibit SJH-12C, Comtech Response to CTL DR 2(a).

[7] See Exhibit SJH-12C, Comtech Response to DR-CTL7.

[redacted][8] This is an odd statement as CenturyLink could have provided Comtech with supplier diversity by itself (by provisioning circuits for SS7 from different networks). Comtech may have assumed that CenturyLink only had one network to offer, thus demonstrating its "[redacted]" was anything but.

To compound the problem, Comtech admits that it knew CLC was providing the circuits for all of its signaling links,[9] but did not disclose its lack of supplier diversity to CLC, WMD, Commission Staff or others.[10] For unknown reasons, Comtech kept its lack of supplier diversity a secret from apparently everyone.

Q. WHAT IS YOUR REACTION TO COMTECH'S FAILURE TO DISCLOSE TO ANYONE THAT IT LACKED SUPPLIER DIVERSITY ON THE SIGNALING LINKS IT USED TO SUPPORT 911 CALLS IN WASHINGTON?

A. In my view this is highly inappropriate. Carriers understand the importance of having SS7 signaling links provisioned through diverse supplier networks or on separate and distinct networks of the same supplier, and this concern is heightened when the SS7 circuits are supporting 911 calling. Carriers uniformly understand the importance of 911 calling. Had Comtech just communicated its lack of supplier diversity to CenturyLink, *CenturyLink could have helped Comtech rectify the issue in short order.*

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8 See Exhibit SJH-12C, Comtech Response to DR-CTL-1.

9 See Exhibit SJH-12C, Comtech Response to DR-CTL-2(e).

10 See Exhibit SJH-12C, Comtech Response to DR-CTL-4(c).

Q. WHAT IS COMTECH'S REACTION TO ITS LACK OF SUPPLIER DIVERSITY?

A. This is the interesting thing; even Comtech knew that its lack of supplier diversity created significant risk. This is validated by two emails exchanged between Comtech and its signaling vendor, TNS. The first is from January 2018 [redacted] The second is from September 2018, three months before the outage, and it recognizes that CenturyLink provided all four signaling links, which Comtech described as "obviously not an ideal situation."[11] To compound the problem [redacted]

Q. HAD COMTECH OBTAINED SUPPLIER DIVERSITY ON THE SIGNALING LINKS IT USED TO SUPPORT 911 CALLS IN WASHINGTON, WOULD 911 CALLS DESTINED FOR COMTECH'S PSAPs HAVE DROPPED IN DECEMBER 2018 WHEN THE GREEN INFINERA NETWORK WENT DOWN?

A. No, they would not. This is the entire purpose of supplier diversity.

Q. GIVEN THIS FACT, WHAT CAUSED THE CALLS DESTINED FOR COMTECH'S 47 PSAPS IN DECEMBER 2018 TO DROP?

A. This answer is simple. It was Comtech's failure to design the signaling supporting its 911 calling in Washington with supplier diversity. Addressing this one issue—an issue Comtech knew it should address—would have prevented the 911 calls destined for

[11] See Exhibit SJH-12C, Comtech Response to DR-CTL4(c).

Comtech PSAPs from dropping.

Q. DOES PUBLIC COUNSEL'S WITNESS AGREE THAT A LACK OF SUPPLIER DIVERSITY CAUSED THE OUTAGE?

A. Yes, although he tries to blame CLC for it. As noted earlier, Mr. Rosen admits that the dropped 911 calls were caused by a lack of supplier diversity: "I believe the failure occurred because all four links used the same optical network. In building 9-1-1 systems, I generally advise that supplier diversity be used to guard against the kind of failure that occurred here. In this case, there was no supplier diversity."[12]

IV. NETWORK OUTAGES

Q. TO WHAT DOES COMMISSION STAFF ATTRIBUTE COMTECH'S FAILURE TO COMPLETE 911 CALLS IN DECEMBER 2018?

A. Commission Staff takes a completely different position from Public Counsel on the direct cause of the outage. Mr. Webber states that CLC experienced an outage due to a packet storm on its Red (i.e., legacy Level 3) network in February 2018, which should have led CenturyLink to close a "management channel" on its Green (i.e., legacy CLC) Infinera network—the network that experienced the outage in December 2018.

Q. WHAT IS YOUR REACTION TO STAFF'S POSITION?

A. I completely disagree. Mr. Webber's testimony is highly superficial and, from my reading, made no attempt to understand the details of the February 2018 Red Outage or the December 2018 Green Outage. A review of the facts shows that the two outages,

[12] Rosen Direct, at 20-21.

while both related to a packet storm, were extremely different, and had different root causes. In the testimony below, I set forth facts showing very clearly that the December 2018 outage was not foreseeable.

Q. DOES ANYONE AGREE WITH YOU THAT THE GREEN OUTAGE WAS NOT FORESEEABLE?

A. Yes. Infinera's technical expert who interacted with CenturyLink during both the Red and Green Outages disagrees with Mr. Webber. I attach as Exhibit MDV-3C an affidavit from Thomas McNealy, a Senior Director at Infinera, who states that "To give context to why the Green Outage was not foreseeable or predictable I will briefly describe the Infinera equipment and how it operates."[13] Mr. McNealy then spends eight pages describing how the Red and Green Outages were very different, and how the December 2018 outage was not foreseeable.

Q. LET'S FOCUS ON STAFF'S CLAIMS. ARE YOU AWARE OF THE CIRCUMSTANCES THAT LED TO AN OUTAGE ON THE RED (LEVEL 3 COMMUNICATIONS) NETWORK IN FEBRUARY 2018?

A. Yes.

Q. PLEASE DESCRIBE WHAT CAUSED THE RED OUTAGE.

A. In early 2018, Level 3 Communications, LLC—a CenturyLink affiliate—was implementing a software change on its Infinera DTN Nodes. During implementation of this software upgrade, a malformed packet was generated that caused a break down in certain communications on the Infinera Red network. [redacted]

[13] Exhibit MDV-3C at ¶ 6.

[redacted]

Q. HOW DOES MR. MCNEALY DESCRIBE THE RED OUTAGE TODAY?

A. Mr. McNealy states:

[redacted]

[redacted]

Q. DID THE FEBRUARY 2018 OUTAGE ON THE RED NETWORK HAVE ANY IMPACT ON 911 CALLS IN ANY LOCATION?

A. Not to my knowledge.

Q. THERE IS A DOCUMENT THAT SAYS INFINERA [redacted]?

A. Yes. Mr. Webber refers to a document where Infinera "[redacted][15] However, Mr. Webber misinterprets the document.

[redacted]

[14] Exhibit MDV-3C at ¶¶ 14-18.

[15] Direct Testimony of James D. Webber (Dec. 15, 2021) ("Webber Direct"), at 7, citing Exhibit JDW-5C at 9.

[redacted]

Q. DID INFINERA GIVE CENTURYLINK ADVICE ABOUT WHAT TO DO WITH THE IGCC ON ITS GREEN NETWORK?

A. Yes. [redacted]

Q. DOES INFINERA AGREE WITH THESE POINTS?

A. Yes. Mr. McNealy states:

[redacted]

[16] See Exhibit MDV-4C, ECACTL-WAGDEC0001072644 ([redacted]"); ECACTL-WAGDEC0002173334 (same); ECACTL-WAGDEC0001088158 ([redacted]). In contrast, in earlier versions of software, [redacted]." (ECACTL-WAGDEC0002186458).

[redacted][17]

Q. HOW DID MR. WEBBER REACT TO CENTURYLINK'S STATEMENT THAT INFINERA INFORMED CENTURYLINK THAT IT DID NOT NEED TO FURTHER CLOSE THE IGCC?

A. Mr. Webber said that he did not believe CenturyLink's discovery response, which stated that Infinera advised CenturyLink that it could keep the IGCC in the same position.[18] Obviously, Mr. Webber was mistaken.

Q. DID CLC FOLLOW INFINERA'S RECOMMENDATION?

A. Yes. CenturyLink has a practice of following the advice of its equipment venders about how to deploy their infrastructure in the field. When CenturyLink asked Mr. Webber if he had ever ignored the advice of an equipment vendor about how to deploy their equipment, he could not come up with any examples.[19]

Q. WHY DOES CENTURYLINK GENERALLY FOLLOW THE ADVICE OF ITS EQUIPMENT VENDORS?

A. Principally, for two reasons. First, equipment manufacturers like Infinera subject their equipment to an exhaustive battery of tests before deploying their products to the field. As a result, they know how to best utilize, furnish, and install the equipment they manufacture. Second, the telecommunications network is highly complex. [redacted]

[redacted]

[17] Exhibit MDV-3C at ¶ 19.

[18] Webber Direct, at 29-30.

[19] Exhibit MDV-5, Staff Supp. Response to CTL DR-16(b).

[redacted]. Making changes to equipment in the network always creates the potential for unforeseen consequences. CenturyLink is therefore always cautious about making changes to the network that are not necessary. Here, given Infinera's advice that the Red Outage could not recur on the Green network, the prudent course was to do exactly as Infinera advised because modifying the software version controlling the IGCC on Green Network nodes could have had unforeseen consequences (e.g., software defects or hardware failure).

Q. STAFF'S WITNESS MR. WEBBER SAYS THE RED OUTAGE SHOULD HAVE LED CENTURYLINK TO CLOSE THE IGCC ON ALL INFINERA NETWORKS. DO YOU AGREE?

A. No, I do not. Again, in software version 15.3.3, which CenturyLink had deployed in the Green network, [redacted].[20]

Q. DID CLC EXPERIENCE AN OUTAGE ON ITS GREEN INFINERA NETWORK IN DECEMBER 2018?

[20] A bit is the smallest unit of data measurement and can either be a 0 or a 1. One byte is a group of 8 bits, and one byte holds enough information to store one character, say the letter "A". Use of the 64-byte packet size was used as an additional filter to ensure appropriate communication in the nodes.

A. Yes.

Q. WHAT HAPPENED?

A. In December 2018 the Infinera Green network was operating DTN nodes supplied by Infinera and operating with software R15.3.3. Again, R15.3.3 was released prior to R16.2 and [redacted].

In the early morning of December 27, 2018, a node in the Green network in Denver, Colorado spontaneously generated four malformed packets. The malforming caused the packets to become larger than 64-bytes, and at the same time retained header information such that the network thought the data packets were authentic. Because the malforming caused the packets to grow to be larger than 64-bytes, [redacted]. The malformed packets were then transmitted and created a packet storm.

Q. WAS THE ROOT CAUSE OF THE OUTAGE ON THE GREEN NETWORK THE SAME OR DIFFERENT AS THE RED OUTAGE?

A. Completely different. The software version upgrade caused the Red Outage; it was easily understood and replicable. The Green Outage was caused by four malformed packets growing in size while still, mysteriously, retaining their header information. The malformation was a fluke circumstance. [redacted]

Q. DOES INFINERA AGREE?

A. Yes, Mr. McNealy states:

20. [redacted]

21. [redacted]

22. [redacted].[21]

Q. HOW DOES INFINERA DESCRIBE THE OUTAGE ON THE GREEN NETWORK?

A. Mr. McNealy states:

[redacted]

[21] Exhibit MDV-3C at ¶¶ 19-22. TCP refers to the transmission control protocol that operates at the transport layer of the Open Systems Interconnection ("OSI") model. Many people like to think of TCP like a handshake or phone call. At first TCP at the originating destination holds out its hand to see if the party at the end is there. If they are and they respond back by "shaking hands", then a conversation, or TCP session starts. Once a TCP session is established, TCP packets (which are really groups of segments) are transmitted. In simple terms, it's easy to think of a TCP packet as a letter mailed with a return receipt attachment. A TCP packet contains segments such a header, payload body, and a trailer (in actuality there are many more available fields). The header can be thought of as the outside of the envelope that has both a destination address and a return address of the sender. The payload body is analogous to the contents within the envelope. The return receipt attachment part of the letter is akin to certain acknowledgements that packet were delivered correctly.

[redacted]

- [redacted].[22]

Q. GIVEN THESE UNUSUAL CIRCUMSTANCES, WAS THE OUTAGE ON THE GEREN NETWORK FORSEEABLE?

A. Absolutely not. It took a confluence of three issues, each of which was unforeseeable, and all of which had to happen simultaneously for the Green network to experience the outage that it did in December 2018.

Q. DOES INFINERA AGREE?

A. Yes, Mr. McNealy states:

23. [redacted]

24. [redacted]

[22] Exhibit MDV-3C at ¶ 22.

[redacted][23]

V. CIRCUIT ORDERING

Q. IN YOUR OPINION, WAS THE OUTAGE ON THE INFINERA GREEN NETWORK THE DIRECT CAUSE OF COMTECH'S FAILED 911 CALLS IN DECEMBER 2018?

A. No. [redacted]. Despite this, had Comtech designed its 911 network with supplier diversity on its SS7 links as it should have, 911 calls destined for Comtech's 47 PSAPs would have completed.

Q. DOES CENTURYLINK HAVE A PROCESS TO ENSURE CIRCUIT DIVERSITY WHEN IT KNOWS THAT CIRCUITS WILL BE USED TO SUPPORT 911 CALLING?

A. Yes, if a service provider/carrier ordering circuits indicates that the circuits support 911 calling and that they would like to order circuits with some form of diversity, CenturyLink would identify diversity options based on what was ordered and what diversity options were available based on the situation. That could include ensuring geographic diversity, network diversity and commitments not to groom circuits without approval from the customer. It is the responsibility of the customer to identify the need for circuit diversity. CenturyLink's Wholesale Product Catalog for 911 service ordering

[23] Exhibit MDV-3C at ¶¶ 23-24.

(available to all customers online)[24] makes this explicit:

> You can order diverse routing for 911/E911 circuits, if facilities are available. These trunks must be provisioned to conform to the standard CAMA signaling format. When CenturyLink facilities are available, CenturyLink will comply with diversity of facilities and systems as ordered by you. Where there is alternate routing of 911/E911 calls to a PSAP in the event of failures, CenturyLink shall make that alternate routing available to you.

Q. HOW DO CARRIERS MAKE CENTURYLINK AWARE OF THE FACT THAT A CIRCUIT WILL REQUIRE DIVERSITY?

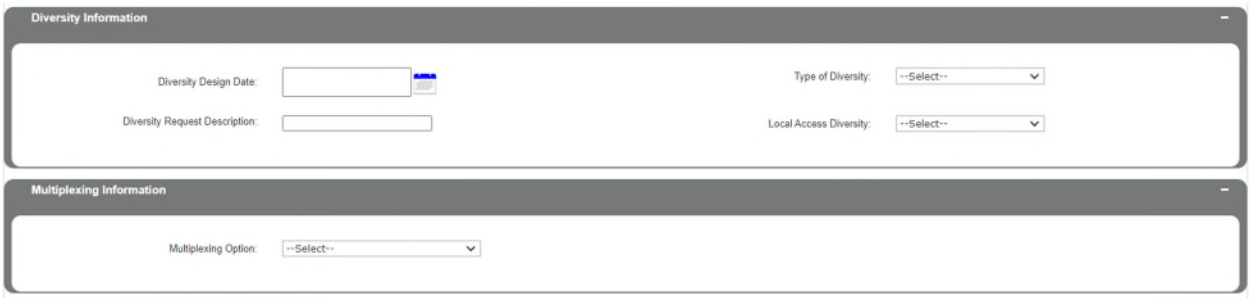
A. CenturyLink's online wholesale ordering tools provides at least three opportunities for the customer to indicate the need for special protection for the services and/or seek diversity. See Exhibit MDV-6, which contains the online ordering form for wholesale private line services. First, the customer is required to inform CenturyLink whether it requires Telecom Priority Status ("TSP") for the private line services being ordered.[25] In discovery, Comtech acknowledged that it didn't bother seeking TSP (for which it would have incurred a fee). "[Comtech] did not seek TSP 1 classification for the four CenturyLink DS-1 circuits in large part due to the expected redundancy and reliability that should come with utilizing four different DS-1 circuits."[26] Second, the ordering form contains an entire section that seeks diversity-related information.[27]

[24] https://www.centurylink.com/wholesale/pcat/911.html

[25] TSP service is more fully described on CenturyLink's website at https://www.centurylink.com/wholesale/clecs/tsp.html

[26] See Exhibit MDV-7C, Comtech response to data request PC-5.

[27] See Exhibit MDV-6.



Finally, the online ordering portal provides a customer the opportunity to attach relevant documentation and input open-ended comments. As discussed below, Comtech did not take advantage of any of these opportunities to seek and ensure diversity for its SS7 links.

Q. IS THERE A COST ASSOCIATED WITH THE ADDITIONAL STEPS PERFORMED BY CENTURYLINK WHEN A CIRCUIT WILL BE USED TO SUPPORT 911 SERVICE?

A. Yes. TSP status carries non-recurring and monthly recurring fees, as specified in CenturyLink's federal and state tariffs.[28] In terms of diversity, a wholesale customer will be charged non-recurring and/or monthly recurring charges, as reflected in its wholesale services agreement.

Q. DID COMTECH SUBMIT ORDERS FOR THE SS7 LINKS THAT WERE TO BE USED FOR 911 SERVICES IN WASHINGTON DIRECTLY TO CENTURYLINK?

A. In part yes and in part no. Comtech ordered two circuits for itself, and its SS7 vendor TNS ordered two of the circuits.

[28] See https://www.centurylink.com/tariffs/fcc_clc_ixc_rss_no_8.pdf (Schedule No. 3, Section 4, Original Page 8; Schedule No. 3, Section 6, 1st Revised Page 24).

Q. DID THE CIRCUIT ORDERS THAT COMTECH SUBMITTED TO CENTURYLINK IDENTIFY THE CIRCUITS AS ONES TO BE USED TO SUPPORT 911 CALLING OR REQUEST DIVERSITY?

A. No. Comtech did not avail itself of any of these opportunities to share with CenturyLink that it required diversity. In fact, Comtech did not utilize the wholesale portal at all. Instead, Comtech merely emailed a retail order that simply identified its need for circuits connecting certain locations. Comtech did not identify the purpose of the circuits and did not indicate any need for network diversity or other special treatment. See Exhibit MDV-8C. The only details provided by Comtech are indicated in the "Note to Processor" field below:

[redacted]

Q. DID THE CIRCUIT ORDERS THAT TNS SUBMITTED TO CENTURYLINK IDENTIFY THE CIRCUITS AS ONES TO BE USED FOR 911 CALLING?

A. No. Comtech simply submitted a retail order for point-to-point circuits to specific locations with no further explanation or detail.

Q. WHAT DID THIS MEAN TO CENTURYLINK?

A. Circuits on CLC's national network are, by design, basic circuits unless the customer

completes an order form indicating otherwise. Circuits are customizable, meaning customers can use these basic circuits for many potential uses, and customers do not have to inform CLC of their intended use.

Q. HAD COMTECH INFORMED CLC THAT THESE 4 CIRCUITS (TWO ORDERED DIRECTLY AND TWO ORDERED VIA TNS) WERE TO BE USED FOR 911 SS7 FUNCTIONALITY, WHAT WOULD CENTURYLINK HAVE DONE?

A. Had Comtech informed CLC that these 4 circuits were to be used for 911 SS7 functionality, CLC would have attempted to assist Comtech in securing supplier diversity, and would have recommended that Comtech place circuits on different CenturyLink networks.

Q. HAD COMTECH TAKEN THIS BASIC STEP, WOULD THE GREEN OUTAGE HAVE IMPACTED 911 CALLING IN WASHINGTON?

A. No. Despite the packet storm, had Comtech designed its network appropriately, 911 calls would have completed in December 2018.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. It does.