



February 15, 2019

Daniel P. Wolf
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, Minnesota 55101

PUBLIC DOCUMENT

RE: **Public Comments of the Minnesota Department of Commerce**
Docket No. P421, P6049/CI-18-542

Dear Mr. Wolf:

Attached is the joint report from the Department of Public Safety and the Department of Commerce concerning the 9-1-1 Outage of August 1, 2019.

PUBLIC DOCUMENT - TRADE SECRET DATA HAS BEEN EXCISED.

Sincerely,

/s/ Daniel Craigie
Deputy Director
MN Department of Public Safety
Emergency Communication Networks Division

/s/Joy Gullikson
Rates Analyst

DC/JG/jl
Attachment

PUBLIC DOCUMENT- CONTAINS TRADE SECRET DATA

**JOINT REPORT OF THE MINNESOTA DEPARTMENT OF PUBLIC SAFETY AND
THE MINNESOTA DEPARTMENT OF COMMERCE CONCERNING THE 9-1-1 OUTAGE
AUGUST 1, 2018**

Introduction

On August 1, 2018 between 3:47pm and 4:52pm CST, 693 calls placed to 9-1-1 failed to reach a Public Safety Answering Point (PSAP) because a technician at West Safety Services (West), a third party vendor for CenturyLink, was doing 'routine' trunk provisioning and made a configuration error. This service disruption affected wireline, wireless, and VoIP calls at 81 PSAPs in the state¹, but was not a complete outage. During this time, 356, or one-third of the 9-1-1 calls placed, successfully completed to a PSAP.

No automatic alarms were activated and sent to PSAPs by this service disruption. Once West became aware of the issue, they initiated efforts to make a configuration change to allow all 9-1-1 calls placed in MN to complete successfully. CenturyLink initiated their "PSAP Notification" process to inform all PSAPs in the state of the issue.

The purpose of this report is to:

- Describe the outage
- Explain the root cause analysis and mitigation efforts of CenturyLink
- Discuss the lack of systems in place to warn of blocked calls when routine maintenance occurs
- Discuss notification problems and communications to agencies, PSAPs, media, and the public during an outage
- Summarize the results of the investigation and recommend actions to the Commission.

A. *Description of Outage*

Description of Minnesota's 9-1-1 System

Minnesota's current 9-1-1 system is depicted in Figure 1. One significant characteristic of this system is that every 9-1-1 call in Minnesota routes through facilities in either Miami, FL or Englewood, CO. This network configuration exists for the majority of the 9-1-1 networks in the country that use West, contracted through CenturyLink.

¹ There are 102 PSAPs in Minnesota and no 9-1-1 activity occurred in the areas serviced by 21 PSAPs during this outage.

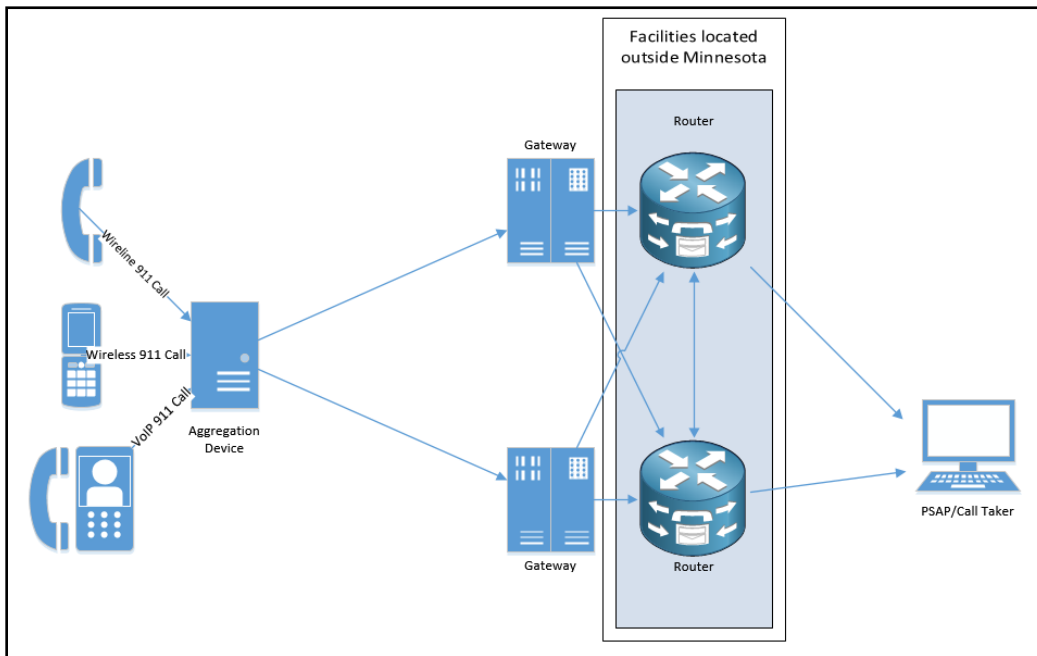


Figure 1

To note:

- The aggregation device, or Selective Router, aggregates all 9-1-1 calls from a specific geographic region. Minnesota currently has twelve selective routers in service across the state. The selective routers are hubs for each carrier to interconnect into the 9-1-1 system.
- The Gateways serve as entry points for 9-1-1 calls from the selective routers into Minnesota’s Emergency Services IP Network (ESInet).
- Once inside the ESInet, a 9-1-1 call is sent to 1 of 2 routers, also called Emergency Communications Management Centers (ECMC), in Englewood, Colorado or Miami, Florida. The ECMC then routes the call to the appropriate PSAP in Minnesota.
- As this is a generalized diagram, it is important to realize that dozens of telecommunications circuits and several dozen pieces of telecommunications equipment make up this system. It only takes a few seconds for an average 9-1-1 call to traverse the network and arrive at the PSAP.

This configuration, which aggregates calls across the country, was presented to the Emergency Communication Networks Division² (ECN) as part of the an RFP process that was approved in 2011 and once again in 2016. The current system utilizes “Next-Generation Selective Routers” for call processing. The two routers, located in geographically diverse locations, are intended to be redundant hubs for customers of CenturyLink and West across the nation that chose this model. This configuration offers significant cost-savings to Minnesota’s 9-1-1 program, while still providing a robust technical solution as separate ECMC routers and infrastructure do not

² ECN is one of 14 divisions under the Department of Public Safety and is tasked with overseeing MN’s 9-1-1 program, along with the statewide Land-Mobile Radio system, Emergency Alerting, and Wireless Broadband.

need to be deployed, maintained, and monitored for only the State of Minnesota. West is a subcontractor of CenturyLink for the ECMC routers located in Englewood and Miami.

Description of Events on August 1, 2018

On August 1st, at 3:47 pm, a technician provisioning a trunk to the Miami ECMC **[TRADE SECRET DATA HAS BEEN EXCISED]**³ This disruption lasted until 4:52 pm when “the vendor reversed the provisioning change which resolved these issues and restored 9-1-1 service.”⁴ In total, 693 9-1-1 calls placed during the 65-minute service disruption were not successfully completed due to the error, and 356 9-1-1 calls were successfully routed through the redundant Englewood ECMC. It is unknown how severe the ramifications may be of these 693 calls not being successfully completed.

During the outage, some calls successfully routed, but most did not. For Minnesota, the Miami ECMC is considered the primary router for 9-1-1 calls, but due to network configuration and load balancing within the system, a portion of the calls are sent to Englewood for routing (and network redundancy purposes), and in this instance, were successfully completed.

No automatic alarms were triggered by West’s provisioning activity. Neither CenturyLink nor the State of Minnesota were made aware of the work being done at West since it was erroneously considered to be routine and not service affecting.

B. Root Cause and Initial Mitigation and Correction Efforts

The following is a summary created and shared by CenturyLink that details the cause of the outage and the initial mitigation efforts. DPS and Department notes are in *italics*. **[TRADE SECRET DATA HAS BEEN EXCISED]** *West/CenturyLink does not explain why West’s operating procedures fail to alarm providers when such ‘inadvertent’ errors cause 9-1-1 calls to fail.*

- **[TRADE SECRET DATA HAS BEEN EXCISED]**⁵.

The actions and subsequent explanations of CenturyLink and the experiences of the PSAPs and DPS indicate two major concerns associated with 9-1-1 in Minnesota:

1. There exist flaws in the 9-1-1 system that prevent alarms and notifications to the vendor (or CenturyLink) of activity that does or might cause failures in the systems.
2. Notifications to PSAPs and to DPS are not timely and create difficulties in keeping the public and the responsible agencies informed.

C. Legal References

The statute that deals directly with 9-1-1 is Minnesota Statutes Chapter 403. This statute:

³ Per CenturyLink’s Official Reason for Outage, See Attachment 1.

⁴ Statement provided to DPS by CenturyLink, see Information Request Response No. 6, Attachment 2.

⁵ See CenturyLink’s Official Reason for Outage, Attachment 1.

- Requires contracts to be based upon tariffs on file at the Commission (403.025, sub. 7),
- Authorizes the Commission to request the attorney general to commence proceedings before the district court pursuant to section 237.27 against any wire-line telecommunications service provider that refuses to comply with Chapter 403, (403.09, sub, 2)
- Requires the Public Utilities Commission to set the amount charged to each customer access line or other basic access service, (403.11, sub. 1 (c))
- Allows CLECs holding certificates of authority from the Commission to be eligible to receive payments for recurring 9-1-1 services, (403.11, sub. 1 (e)),
- Requires the commissioner of public safety to certify to the chair of the Commission that a wireless carrier is not in arrears (403.11, sub. 3d.),
- Requires providers to notify the DPS Commissioner at the same time it files tariff or price list changes concerning 9-1-1 with the Commission (403.11, sub. 5)
- Sets an effective date of 60 days after the first day of the first calendar month after the DPS Commissioner or the Public Utilities Commission, changes the fee (403.11, sub.7 (c)).

7810.0600 REPORT TO COMMISSION ON SERVICE DISRUPTION.

Each telephone utility shall report promptly to the commission any specific occurrence or development which disrupts the service of a substantial number of its customers or which may impair the utility's ability to furnish service to a substantial number of customers.

7810.3300 MAINTENANCE OF PLANT AND EQUIPMENT.

Each telephone utility shall adopt and pursue a maintenance program aimed at achieving efficient operation of its system so as to permit the rendering of safe and adequate service. Maintenance shall include keeping all plant and equipment in good state of repair consistent with safety and adequate service performance. Broken, damaged, or deteriorated parts which are no longer serviceable shall be repaired or replaced. Adjustable apparatus and equipment shall be readjusted as necessary when found by preventive routines or fault location tests to be in unsatisfactory operating condition. Electrical faults, such as leakage or poor insulation, noise, induction, cross talk, or poor transmission characteristics, shall be corrected to the extent practicable within the design capability of the plant affected.

7810.4900 ADEQUACY OF SERVICE.

Each utility shall employ reasonable engineering and administrative procedures to determine the adequacy of service being provided to the customer. Traffic studies shall be made and records maintained to the extent and frequency necessary to determine that sufficient equipment and an adequate operating force are provided during the busy hour, busy season. Each telephone utility shall provide emergency service in all exchanges operated in which regular service is not available at certain periods during the 24 hours of the day. When service is not continuous for the full 24-hour day, proper arrangements shall be made for handling emergency calls during the off-periods by the use of alarms maintained in proper conditions with someone conveniently available so that emergency calls will be given prompt attention.

Each utility shall employ adequate procedures for assignment of facilities. The assignment record shall be kept up to date and checked periodically to determine if adjustments are necessary to maintain proper balance in all groups.

237.461 ENFORCEMENT.

Subd. 1 Actions. This chapter and rules and orders of the commission adopted under this chapter may be enforced by any one or combination of: criminal prosecution, action to recover civil penalties, injunction, action to compel performance, and other appropriate action.

Subd. 2 Civil penalty. A person who knowingly and intentionally violates a provision of this chapter or rule or order of the commission adopted under this chapter shall forfeit and pay to the state a penalty, in the amount to be determined by the court, of at least \$100 and not more than \$5,000 for each day of each violation.

The FCC rules governing 9-1-1 include 47 C. F. R. § 4.9 , which states: “All wireline communications providers shall submit electronically a Notification to the Commission within 120 minutes of discovering that they have experienced on any facilities that they own, operate, lease, or otherwise utilize, an outage of at least 30 minutes that:

- (1) Potentially affects at least 900,000 user minutes of either telephony or paging;
- (2) Affects at least 1350 DS3 minutes;
- (3) Potentially affects any special offices and facilities . . . or;
- (4) Potentially affects a 9-1-1 special facility⁶ . . .

D. The Lack of Systems in Place to Warn of Blocked Calls Endangers Public Safety

The August 1st outage was not the first time that 9-1-1 calls in Minnesota failed to complete recently due to routine activity of West. On July 9, 2018, West initiated maintenance on equipment in Miami resulting in 55 9-1-1 calls not successfully completing. On August 21st, a similar maintenance event was initiated by West with 35 9-1-1 calls not successfully completing. Like the August 1st outage, the August 21st incident was not a complete system outage because calls processing through the Englewood, CO location completed successfully.

More recently, the news has been rife with reports of nationwide CenturyLink network failures beginning December 27, 2018 that appear to have caused 9-1-1 outages in many states. In Minnesota, where the network was down, 9-1-1 calls could not originate and there is no way to know how many 9-1-1 calls were attempted, but did not go through. Wireless calls and texts to 9-1-1 continued to work during this time.

⁶ Special offices and facilities are defined as major military installations, key government facilities, nuclear power plants, and those airports that are listed as current primary (PR), commercial service (CM), and reliever (RL) airports in the FAA’s National Plan of Integrated Airports Systems 47 C. F. R. § 4.9 4. (b) An outage that potentially affects a 9-1-1 special facility occurs whenever: (1) there is a loss of communications to PSAP(s) potentially affecting at least 900,000 user-minutes and the failure is neither at the PSAP(s) nor on the premises of the PSAP(s); no reroute for all end users was available; and the outage lasts **30 minutes or more**; or (2) there is a loss of 9-1-1 call processing capabilities in one or more E-9-1-1 tandems/selective routers for at least **30 minutes duration**. 47 C. F. R. § 4.9 4. (e). emphasis added.

DPS chose the national next-generation nationwide system for its Minnesota 9-1-1 traffic because the redundant routing on a nationwide basis is cost efficient and is supposed to prevent calls from failing. CenturyLink states that it is working with West and the DPS to correct the problems that caused the August 1st outage. DPS believes that the pace of the correction is slower than it should be.

Minn. Rule 7810.3300 states: “[m]aintenance shall include keeping all plant and equipment in good state of repair consistent with safety and adequate service performance.” Activity that erodes public safety through normal business practices is unacceptable. Calling the mistake of a worker that prevents 9-1-1 from working “inadvertent” is of small comfort to the citizens relying on the 9-1-1 system to render aid. Further, while neither statute nor rules directly address call completion metrics with 9-1-1 service, CenturyLink clearly has a requirement to “. . . furnish and maintain adequate plant, equipment, and facilities to provide satisfactory transmission of communications.”⁷ West is a contractor for CenturyLink and CenturyLink is responsible for the actions of its subcontractor. When a member of the public dials 9-1-1, it is critical, perhaps a matter of life or death, that the call be completed to the PSAP. Actions of the provider, be that of the contracted provider or its subcontractor, no matter how “inadvertent,” must not disrupt service and CenturyLink should be held accountable for these failures.

An alarm system is clearly needed to cover all instances where calls may not be able to route. The DPS understands that the alarming types of mechanisms can be sensitive. Too many alarms that are not indicative of signs of trouble can cause a “Peter and the Wolf” type problem, where the network workers become inured to the alarms. CenturyLink has stated that it and West are in talks with the DPS to ensure that the kind of alarming that is needed, when 9-1-1 calls are not properly routed, is put in place. The DPS reports that the talks move slowly.

The Department and the DPS are recommending that the Commission require six monthly reports from CenturyLink containing the following:

- 1) Minutes from the meetings between CenturyLink and the DPS that explain the fixes attempted and the results of those attempts;
- 2) All improvements made to ensure any activity that causes 9-1-1 calls to fail are immediately noticed to CenturyLink and the DPS
- 3) All improvements that ensure corrective action is taken as quickly as possible with any 9-1-1 failure.
- 4) An explanation of the progress made over the previous month as a result of the meetings.
- 5) The number and circumstance of any failed 9-1-1 calls during the preceding month and the reason for failure. This should include instances and durations where network failures prevented consumers from being able to dial 9-1-1.

⁷ Minn. Rule 7810.4000

At the request of DPS, this report should not be the responsibility of CenturyLink's program staff⁸, so as to not place an additional burden on day-to-day operations and program management. If the Commission finds any report indicates a lack of urgency devoted to this issue, then the Commission may choose to make a determination on whether CenturyLink is complying with its regulatory obligations, and if not, to determine what other remedies it can Order to ensure this matter receives the attention it deserves.

E. *Communication to PSAPs and to the DPS Must Improve*

Day-to-day communication between CenturyLink program staff and DPS plays a key role in the overall success of Minnesota's 9-1-1 program. However, the DPS reports that the automated communications between CenturyLink and the PSAPs and the DPS are substandard. The DPS's Information Officer is the liaison between the ECN and the public and the media. CenturyLink failed to officially report the outage to the DPS in a timely manner; the DPS first became aware of the outage when the Public Information Officer at DPS noticed counties posting about "9-1-1 issues" on social media. When 9-1-1 calling is not working properly, notifications to PSAPs, DPS and the responsible regulatory agencies need to be timely, to keep the public informed, which may include providing the public with alternative means to reach emergency services.

The August 1st outage started at 3:47pm and CenturyLink confirmed they learned about the issue at approximately 3:58pm, but most PSAPs did not receive official notification until 4:59 pm, more than an hour after the outage began, and after the outage officially ended. This timeframe was confirmed by several PSAPs across the state. Further, the content of the emailed notifications provided no specific details to PSAPs. See Attachment 3 for an example of such notification.

CenturyLink did not provide any statement containing information that DPS could release to the public until 2:20 pm the next day (August 2, 2018). This was despite, DPS's request for updates before a meeting with the media that was scheduled for 1:30 pm on August 2nd. The lack of complete and reliable information that could be passed on to the public nearly 24 hours after the event represents an unacceptable and unnecessary delay in the flow of information

A confirmed and accurate list of numbers that experienced failed attempts to call 9-1-1 during the outage was not shared with DPS until August 7th at 11:42am. Further, it appears that all communications from CenturyLink and West were funneled through a single person. This person, a service manager and sales engineer, is also responsible for the technical operations of Minnesota's 9-1-1 system along with responsibilities for Iowa's emergency communications and for ensuring that the correct engineering was done to fix the problems. Public interest demands quick, competent communications in an emergency, such as a 9-1-1 outage. While there is little doubt that the person assigned to be the liaison between the companies, the DPS, and the PSAPs is highly competent, there is also little doubt that he is responsible for so many diverse tasks that it is quite impossible to make all tasks top priority.

⁸ These are CenturyLink's Program, Account, Service, and Database Managers who all have significant and important tasks on daily basis that should not be interrupted.

The Department and the DPS recommend that the Commission assist the DPS as it works to determine communications protocols and information content during any network issue by ordering that the DPS and CenturyLink (including its vendors) to meet as often as the DPS determines, but not less than monthly, until a workable communications protocol is in place. Such protocol shall provide for simultaneous PSAP and DPS notifications, and notifications to the PUC and Department, that are timely and contain sufficient information for the DPS and the PSAPs to speak to the public and press with meaningful information.

F. Summary and Recommendations

The Department and the DPS agree that the outage of August 1, 2018 indicates that CenturyLink did not provide safe and adequate service. A redundant selective router failed to pass on 9-1-1 calls due to the “routine” provisioning of a worker. The outage was due to human error, and there were no alarm and notification systems in place that would detect this outage.

The Department and DPS recommend that the Commission order:

1. CenturyLink to engage in meetings with DPS and file six monthly reports that contain the following:
 - a) Minutes from the meetings between CenturyLink and the DPS that explain the fixes attempted and the results of those attempts;
 - b) All improvements made to ensure any activity that causes 9-1-1 calls to fail are immediately noticed to CenturyLink and the DPS
 - c) All improvements that ensure corrective action is taken as quickly as possible with any 9-1-1 failure.
 - d) An explanation of the progress made over the previous month as a result of the meetings.
 - e) The number and circumstance of any failed 9-1-1 calls during the preceding month and the reason for failure. This should include instances and durations where network failures prevented consumers from being able to dial 9-1-1.
2. CenturyLink, and if CenturyLink or DPS desires, any CenturyLink vendor such as West Safety Services, is to meet with DPS to establish procedures and protocols to ensure that proper information is provided to DPS, PSAPs, Metropolitan Emergency Services Board, and others as determined by DPS, following any network 9-1-1 incident. DPS will determine the number and frequency of such meetings. If at any time, DPS becomes uncomfortable with the cooperation and progress of CenturyLink, the matter may be brought to the Commission for resolution.

**ATTACHMENT 1 HAS BEEN
REMOVED IN ITS ENTIRETY**

**Minnesota Department of Commerce
Division of Energy Resources
Information Request**

Docket Number: P6049, P421/CI-18-542 Nonpublic Public
Requested From: CenturyLink Date of Request: 8/24/2018
Type of Inquiry: General Response Due: 9/4/2018

Requested by: Joy Gullikson
Email Address(es): Joy.gullikson@state.mn.us
Phone Number(s): 651-539-1877

Request Number: 6
Topic: [Click or tap here to enter text.](#)
Reference(s): [Click or tap here to enter text.](#)

Request:

Please provide copies of all notifications to the Minnesota Department of Public Safety, to Public Safety Answering Points (PSAPs), and to the general public that were issued concerning the 911 outage of August 1, 2018.

Response

CenturyLink is in the process of gathering responsive documents and expects to supplement this response by the end of the week.

Attached as Confidential Attachment 6A is a spreadsheet identifying when notifications were sent to Public Safety Answering Points.

CenturyLink issued the following statements concerning the 911 outage of August 1, 2018 to the media and the public:

Statement 1 - 08/1/18

We are aware of a 911 issue in your area. Our technical team is looking into the situation. We will provide updates as more information becomes available. In case of an emergency public safety officials recommend the use of wireless phones to call 911.

To be completed by responder

Response Date:
Response by:
Email Address:
Phone Number:

**Minnesota Department of Commerce
Division of Energy Resources
Information Request**

Docket Number: P6049, P421/CI-18-542 Nonpublic Public
Requested From: CenturyLink Date of Request: 8/24/2018
Type of Inquiry: General Response Due: 9/4/2018

Requested by: Joy Gullikson
Email Address(es): Joy.gullikson@state.mn.us
Phone Number(s): 651-539-1877

Statement 2 - 08/1/18

On August 1, there was a 911 issue in your area. At this time services are restored. Our technical team is investigating the root cause of the service disruption. We used "Minnesota" for all MN inquiries but others saw "your area" instead.

Statement 3 - 08/2/18

On August 1, 2018, a third-party vendor had an outage that impacted CenturyLink services for approximately an hour. The impact of the vendor outage to CenturyLink affected enhanced services supporting 911. CenturyLink is working with the vendor to understand the root cause and preventive measures.

Statement 4 - 08/17/18 (for Minnesota reporters)

We take 911 services very seriously and are committed to providing this critical service in a reliable manner. Our 911 system is working properly, and we continue to work closely with our vendor to help ensure this issue does not happen again.

Minnesota DPS Statement

Statement - 08/07/18

CenturyLink shared that on August 1, 2018 at approximately 3:47 p.m. (CDT), a CenturyLink vendor experienced an event impacting 911 services for several Public Safety Access Points (PSAPs) in the State of Minnesota. Upon investigation, the vendor identified the root cause of the event as a provisioning change by its employee that created an unexpected impact. This provisioning change prevented the primary switch from accepting inbound 911 calls for routing to PSAPs. While a redundant switch was operational, the provisioning changes also prevented 911 call failover from occurring between the primary and redundant switches. Later that afternoon, at approximately 4:52 p.m. (CDT), the vendor reversed the provisioning change which resolved these issues and restored 911 service. CenturyLink took additional steps to ensure that all 911 services were restored.

To be completed by responder

Response Date:
Response by:
Email Address:
Phone Number:

**Minnesota Department of Commerce
Division of Energy Resources
Information Request**

Docket Number: P6049, P421/CI-18-542 Nonpublic Public
Requested From: CenturyLink Date of Request: 8/24/2018
Type of Inquiry: General Response Due: 9/4/2018

Requested by: Joy Gullikson
Email Address(es): Joy.gullikson@state.mn.us
Phone Number(s): 651-539-1877

CenturyLink has requested that the vendor take immediate corrective actions intended to prevent recurrence. These actions include imposing an immediate change moratorium for all vendor provisioning work on the CenturyLink emergency services platform pending a full review of this event; reviewing and enhancing the Method of Procedure process, related documentation, and validation steps including additional route test calls; developing and implementing additional post-change testing procedures and validation; and enhancing alarming and training. The vendor has requested that the switch vendor enhance current provisioning software to provide additional validations that are designed to prevent unintended configuration changes from occurring.

CenturyLink and the vendor are continuing to investigate 911 call attempts made during the event. CenturyLink will continue to track the progress of all corrective actions initiated by the vendor.

To be completed by responder

Response Date:
Response by:
Email Address:
Phone Number:

**ATTACHMENT 3 HAS BEEN
REMOVED IN ITS ENTIRETY**