ADS Testimony- Update on Statewide Internet Outage
Joint Information Technology Oversight Committee

Friday, September 28, 2018

Event: Internet Outage

At approximately 9:19am on Wednesday August 8, 2018, the State of Vermont (SOV) experienced a network outage that disrupted Internet access for all SOV users.

The cause of the outage was determined to be a FirstLight (vendor partner) fiber cut that caused the failure of multiple data circuits across the region including the State's Internet pipes. As outlined by FirstLight, the event that triggered the outage was a fiber cut, by a squirrel, of the FirstLight Internet circuit that connects state government to the Internet. Following is from the First Light Reason for Outage Report:

> ***"Event summary***
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> *On Wednesday, August 8th, 2018, FirstLight experienced a backbone network failure between Williston, VT and Essex Junction, VT, resulting in a widespread service impact in the region.*
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> *This outage was the result of a backbone fiber break on the FirstLight network on Lincoln Terrace, Essex Junction, VT. This break was the result of a squirrel chew on a 72 count fiber that partially damaged multiple tubes within this backbone sheath.*
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> *This event has a widespread impact on the State of Vermont WAN and Internet services.*
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> ***Sequence of Events:***
>
> ***Wednesday, August 8th, 2018***
>
> *9:22AM FL NOC observes a high volume of alarms across multiple systems, signaling a transport issue between Williston, VT and Essex Junction, VT*
>
> *9:35AM FL NOC and Engineering confirm there appears to be a likely fiber break between the Williston, VT and Essex Junction, VT core nodes.*
>
> *9:40AM FL NOC dispatches field technician to Williston, VT to perform OTDR shots. Tech ETA is approximately 10:05AM.*
>
> *9:45AM FirstLight Network Engineering begins Analysis and Engineering a work around to reroute affected services onto the Long Haul Transport network.*
>
> *9:50AM State of VT contacts FL repair Center to report Internet and wide area network outages at all sites. Customer informed of known Global event.*

10:05AM FL Tech arrives at Williston, VT central office to perform OTDR testing. Outside plant construction and splicing crews are on standby to deploy if needed.

10:20AM OTDR results indicate a fiber event at or very near the Essex Junction Central Office. Tech dispatches to Essex Junction to perform testing from that end.

10:42AM State of VT escalation contact places escalation call to Jim Capuano. Jim acknowledges and escalates internally to ensure priority communication channels are established for the State's critical outage.

10:35AM FL tech arrives at Essex Junction central office to perform OTDR testing

10:50AM OTDR results indicate a fiber break outside the central office. FL tech is working with Engineering and GIS staff to estimate damage location. Outside plant construction and splicing crews are dispatched to the area.

11:00AM With an outside plant fiber break confirmed, FL Engineering begins evaluating options to reroute impacted services around the event.

11:26AM Steve Bond, VP of Network Operations for FirstLight contacts Shawn Nailor and establishes himself as the ongoing point of escalation contact for the State on this event.

11:45AM Steve Bond provides update to Shawn Nailor, detailing current status and restoration efforts.

12:00PM FL staff have driven suspected area of damage and were unable to locate by visual inspection from the ground. Outside plant construction crew and splicers will be needed to help identify location. Reroute investigation and efforts continue.

12:15PM Outside plant construction and splicing crews are in route to the area. First crew is 10 minutes out and second crew is 30 minutes out.

12:30PM FL outside plant crews have verified that there are no working spare fibers along the impacted path between Williston and Essex Junction. All pre-spliced fibers along this route are impacted by this event.

12:51PM Steve Bond contacts Shawn Nailor with current status updates. During this update Steve brings Shawn's attention to the fact that the State of VT is not using the Legacy Sovernet backup circuits at 21 Gregory Dr.. The PTP circuit is shut down on the State of VT interface and no traffic is leaving the state on the Internet backup. FirstLight sees both of these as up and available on our network. These are the legacy Sovernet 1Gb DIA backup circuit located at 21 Gregory Dr., and the Legacy Sovernet PTP 1GB circuit between 21 Gregory and 1 National Life. These backup circuits are not impacted by the current fiber event and should be functional.

The State and FirstLight begin cooperative investigation into putting these circuits into use. These conversations included Frank Constantino, Shawn, Marty O'Conner from the State. These conversations continue over the course of the next hour or so.

1:00PM Both outside plant crews have arrived and are preparing to drop splice cases and perform OTDR shots to narrow down location of fiber break. Visual inspections continue as well.

1:15PM In parallel with the Outside Plant restoration efforts, FL Engineering and Field technicians are working on building an alternative network route to bypass the impacted network segment. This effort involves technicians working in multiple central offices, placing cards, optics, and fiber jumpers to create a new network segment, while engineers design transport circuits within network equipment.

1:30PM Crews have narrowed down suspected area and are performing a hand over hand inspection of fiber to locate damage.

2:10PM Crews have located the damage on Lincoln terrace, Essex Junction, VT. It is a squirrel chew with multiple tubes damaged. It was extremely difficult to locate because the damage was underneath a fiber tag and not visible. Parallel Engineering efforts on alternate network path design continues.

2:15PM FL observes that the customer interfaces for the legacy Sovernet point to point between 21 Gregory Dr and 1 National have come up. It is not certain what action was taken by the State, but this circuit should now be available to move traffic between those sites. Time of this event is under investigation. Initial reports of up to 60 mg of traffic passing upon restoration are being verified.

2:20PM Outside crews have begun migrating the slack necessary for repair from nearby poles. Estimated that splicing will begin at 3:30PM

2:30PM FL Engineering and technicians have completed building the physical transport for the alternative network route. They are now working on balancing light levels and establishing transport circuits over this route. Once this is complete they will be able to roll services to this alternate path. ETA 30 minutes.

2:45PM Through cooperative troubleshooting, FL IP Engineering determines that the State does not have a default route set for the legacy Sovernet 1G internet circuit. It is determined that the quickest method to resolve this is for FL to announce a default route.

2:50PM FL IP Engineering pushes a default route for the State of VT's legacy Sovernet 1Gb Internet circuit at 21 Gregory Dr and that circuit immediately begins taking high volumes of customer traffic. From this point forward the State has 1Gb of working internet.

Root Cause:

72 count backbone fiber was damaged by squirrel chew as seen below;

The damage was on the top side of the cable and not visible from the ground level. Additionally, the damage was partially concealed underneath a FirstLight Identification tag. This tag can be seen on the left in the picture below. When the damage was found this tag was actually further to the right and partially covering the damage (you can see chew damage on the right side of the fiber tag itself).

The impact to the State was dramatically increased because the legacy Sovernet backup internet and point to point circuits were not in use. This resulted in a complete loss of internet and site connectivity. When this condition was resolved, service was restored (at a reduced capacity of 1Gb).

Corrective Actions:

FirstLight worked with the State to recognize the backup circuit issues, and to put those working services into production, thereby limiting the impact of the fiber outage.

FirstLight identified the offline ports on the point to point circuit, and the State made the necessary changes to bring them on line.

FirstLight then provided a default route on the 1Gb internet after determining that the State did not have a default route assigned.

FirstLight also identified and repaired damaged cable that was the root cause of the event.

The damage was such that a cable section throw was required. FirstLight outside plant staff migrated fiber slack from several poles away, cut the 72 count cable and then spliced the entire fiber back together.

FL NOC and Engineering have confirmed that systems are stabile light levels are recovered to pre-event status.

This was a permanent repair and no further actions are expected to be needed.