

## **Iowa Communication Network** – Outage Report Summary for July 19, 2013

In the effort to keep lines of communication wide open in the technical professional family of the State of Iowa, I wanted to take opportunity to give clarity, additional detail, summary and remedy to the outage involving the NG911 system a week ago.

### **Outage:**

Late in the day on Friday, July 19, the Iowa Communication Network (ICN) reported a faulty interface on a piece of equipment that services Iowa's NG911 services. Some critical core switching equipment appeared to be functional but was in actuality discarding traffic. This resulted in an initial limited outage in the servicing of NG911 (cellular) calls.

### **Outage Scope:**

- The outage **did** impact the NG-911 system but as a result of the backup and resilient designs of HSEMD's NG911 design and the nature of the outage, **it appears that NO cellular based NG911 calls were lost.**
- **NG911 is designed with re-routing layered options should a local Public Safety Answering Point (PSAP) or multiple PSAPs experience service impacting outage.**
- This outage was of a nature that it blew past one layer of redundancy at the ICN but the NG911 system's automatically-designed process routed impacted calls to the Johnston DPS.
- This however, required heavy call loading at backup facilities in Johnston DPS. Far from optimum call routing but a **successful and significant human effort by Johnston DPS**, HSEMD and others to insure calls were not dropped.
- The worst customer impact may have been a slower speed to answer which could feel like a lifetime to someone in danger.
- The outage **did not** impact local wireline 911/E-911 services anywhere in the state that we are aware.
- The above statements do not minimize the hardware failure aspects but shares perspective as to the actual impact to the public.

### **Outage Cause (technical):**

- We always look for a smoking gun or RCA (Root Cause Analysis) and as of right now the ICN and our Vendor are certain we know **WHAT** happened, but the fingerprints as to **which** carrier hardware switch was the culprit may have been wiped clean during the activities in the restoration of services. One major carrier switch in the mix was already slated for a software upgrade and had the code loaded but not running. So when it rebooted the new code loaded, automatically wiping the slate clean.
- We are confident that this problem fits a known software bug description that shows up only in a specific scenario our vendor has only witnessed once before. This bug is contained in only a specific software "sub-revision" of a software code in these units.
- Although 19 of the 28 core ICN carrier switches have been upgraded out of that code range, nine were still in process of migration when we experienced this scenario. We feel the source event is laying somewhere in the weeds of code or code interactions contained in those non-upgraded carrier switches. If they see a specific scenario or condition they begin a rapid discarding of packets although they appear on the surface to remain connected to the world and each other. But behind the curtain, the switch is discarding all traffic.

**Remedy:**

- These carrier grade switches sits atop the ICN network's 40GB fiber core. We have one of the largest networks of its type in the nation. We will soon be raising that core to 100GB and we must have these switches running at optimum and stabilized performance.
- We are aggressively insuring that the core network is running at code levels our vendor feels to be resilient and appropriate for our network design, growth and redundancy parameters.
- **WE WILL BE PERFORMING SIGNIFICANT SOFTWARE UPGRADES in the near field to move us out of this exposure.**
  - **We are planning an emergency upgrade window 11 p.m. Wednesday, Aug. 7, 2013, to 6 a.m. Thursday, Aug. 8, 2013, to upgrade 28 of the core carrier switches. We will obviously work with the NG911 team collaboratively to minimize simultaneous exposure.**
  - We will also continue an aggressive plan to insure the next tier of hardware is not exposed to this errant software revision.
  - This second-tier upgrade will involve numerous nightly windows to upgrade 100+ carrier switches, but will be very limited in scope as far as circuit impact. This process was already underway, but the vendor has recommended a fresh code for the second tier of equipment that aggregates up to these core switches.

The ICN is dedicated to carrier grade levels of uptime and do not take it lightly when we must perform routine or emergency network maintenance that is customer impacting. Most of our change work happens while we in state government are sleeping, but in the case of NG-911 and our Iowa tax payers – “emergencies know no schedules.” We will work diligently to balance our dedication to a high-capacity, stable and resilient network for the state and the 24/7 life safety operations of DPS, Homeland Security and Emergency Management, DOT and others.

–Ric Lumbard, Iowa Communications Network