



Event Summary: Broward County

Office of Regional Communications and Technology

911 System Events # 150816 & #15083

Objective

This report provides a summary of the 911 service anomalies that occurred on January 14th, 2016. Additional technical and itemized detail may be found in the Root Cause Analysis document.

Event Summary

Following a thoroughly reviewed and mutually agreed upon Change Management Process with the Broward County staff, the Broward County users of the system, and the West Safety Services team, the West Safety Services technical staff began an update to the 911 system at approximately 3:30 AM the morning of January 14th. West personnel had successfully performed this identical update on numerous other production 911 systems throughout the Country without issue.

As a planned part of the update procedure, remote Network Help Desk Monitoring was disabled. This planned action likely contributed to a delay in recognition of abnormal behavior as it began to occur within the system.

Immediately after the installation of the update on the primary server platform completed, the onsite West Service technician managing the update does not observe any issues with the system and continues with the update process on the secondary system. Beginning at approximately 4:05 AM a series of escalating alarms and abnormal call processing began to exhibit. Following a number of localized efforts to correct the problem, but with the instability continuing, the West Technician opens a Severity 1 Ticket with the West Help desk at 4:34 AM. This action results in the engagement of remote subject matter experts who begin a series of trouble shooting measures and remedial actions designed to isolate and stabilize the system. This process continued through a series of managed escalations and ultimately the decision at approximately 8:00 AM to shift all traffic to the secondary system. By 8:35 AM, call processing had returned to a normal. The teams continued to work through the morning to determine root cause and to monitor the situation.

At 12:21 PM a second ticket was opened at the West Helpdesk on a report from AT&T that a number of 911 circuits into the Broward 911 network were displaying an alarm status. By 2:30 PM a determination is made on the cause of the abnormal condition, mitigation steps are communicated and implemented by the local teams and by 4:40 PM the corrective procedure was completed.

At 5:00 PM an additional software issue is identified as affecting the login / log off functionality at the Agent positions. A software update is developed, tested and installed on all positions by 8:30 PM after which no further issues with sign in / sign off are reported.

At this point a joint decision was made to leave all traffic on the secondary system until a complete root cause analysis could be completed, and the issue replicated in a lab environment.

The secondary systems perform normally through the eventual migration back to the Primary system which is completed in a series of tightly managed steps, becoming fully operational on the morning of January 18th.

Actual Call Impact

- 426 total 911 calls entered the Broward County systems between 4:05 am ET and 8:35 am ET on 01/14/16.
- Of those 426 calls:

- 55 were processed normally by agents
- 93 additional calls were falsely flagged as abandoned due to the state of the system, but these calls were also actually processed by an agent.
- 36 calls dropped and the caller disconnected before the call was presented again to an Agent.
- 16 calls contained no routing information. All of these 16 calls with valid ANI were redialed, but the lack of routing information does not allow for any further details on whether the call was dropped before presentation or abandoned.
- 226 calls abandoned.
- All abandoned calls with valid ANI were redialed by the call agents

Root Cause Summary

The condition which began during the update process on the primary Viper node (Central) as noted at 4:05 am ET on Thursday January 14th 2016 was caused by a software issue that under a very specific set of circumstances caused the VoIP server software to enter into a stop / restart state. This unique set of configurations existed at the specific time of the update procedure in Broward County. During no other application of this update had this particular configuration been in use, nor was it ever contemplated as being active during an update period and therefore was never included as a part of standard Quality Assurance testing.

A software update KB008276 which contains protection against the condition will be officially released in the coming weeks, and process event plans have been modified to prevent a future occurrence.

Process and Procedure Improvements

The detailed root cause analysis has surfaced several areas for improvement. Steps are being taken to implement a number of changes in the Change Management process to mitigate opportunities for future occurrences of any similar nature.

The primary items are highlighted below:

NOC Monitoring was disabled just prior to the application of the update.

Effective immediately NOC Monitoring will no longer be disabled in advance of any system updates. The West Help Desk will remote monitor the system throughout the update process.

All West Field technicians and Help Desk personnel will be required to complete Event Management training and attend regular refresher training. The goal will be to improve decision making regarding escalation from the local teams.

Future updates to the Broward System will be managed under the West Event process, insuring escalation decisions are made more rapidly and under the direction of an event commander. The West Safety Services Event Management process is patterned on the Incident Command System component of the National Incident Management Structure (NIMS) developed by the Department of Homeland Security. This provides a standardized approach to the command, control, and coordination of emergency response providing a common hierarchy within which participants from multiple disciplines and agencies can be effective.

The update event process has been modified to include a pause period to insure system health and stability is verified across all systems, before being allowed to proceed to the next step.

West has since conducted an onsite engineering level inspection of the entire Broward System to insure optimization is complete, failover systems function as designed and that all documentation material accurately depicts the current system architecture.

Conclusion

Event Ticket # 150816 & #15083 were triggered by a unique series of circumstances in the midst of a well planned, mutually agreed upon and thoroughly documented event plan, developed under a disciplined Change Management Process that included Broward County staff, Broward County users, and the West Safety Services staff. Once an issue was identified, the teams reacted with a disciplined, structured analysis of the situation and escalated progressively through resolution.

It is important to note that the Broward County design requirements for the implementation of a multi-node system, with each node having fully redundant components, allowed the failure mode of the system to be remediated without incurring a complete disruption of service or "hard down" situation.

At no time was there a need for the CLEC to execute any re-route plans or to transfer calls for assistance outside of the County system. The Broward County system design exceeds the fault tolerant levels implemented in most Agencies across the Country and in this instance was utilized to the fullest capability.

In this series of extremely unique circumstances of events, this level of engineering and redundancy likely prevented a more severe impact to 911 service availability to the community.

Following an extensive and detailed Root Cause Analysis, improvements in software, policies and procedures have been implemented to help in the prevention of similar occurrences in the future.