Communications Continuity for 9-1-1

Pierce Power
911/EOC Consultant

"9-1-1, What is your Emergency?"

Public Safety Landscape

NG 9-1-1

New Tech 9-1-1 Disruptions

Preparedness

Bad day, good recovery
"9-1-1, What is your Emergency?"
Disruptions Abound

Dubuque County 911 phones down
Disruptions Abound

Gallatin Co. 911 restored after outage

By Judith Ratana
Posted: May 09, 2017 07:35 PM MDT
Updated: May 09, 2017 08:11 PM MDT

BOZEMAN, Mont. - Gallatin County lost 911 services for 40 minutes Tuesday after construction workers cut an underground cable.
Fiber Finder
Disruptions Abound

911 BOARD
No emergency calls lost during 911 outage
JAKE OLD • MAY 8, 2017 AT 7:08 PM
Disruptions Abound

911 calling issue resolved for Vanderburgh Co. Sprint

Published: Saturday, May 6th 2017, 10:50 am PDT
Updated: Sunday, May 7th 2017, 11:09 am PDT
Posted by Jared Goffinet, Digital Content Producer

VANDERBURGH CO., IN (WFIE) - Sprint customers are now able to call the Evansville-Vanderburgh County Central Dispatch after a service disruption on Saturday.

According to a press release from Evansville-Vanderburgh County Central Dispatch, Sprint customers had to remain on the line and answer the operator's questions when dialing 911 on Saturday. Vanderburgh County was one of 15 counties in the southern part of Indiana impacted by this outage.
Disruptions Abound

Struthers 911 down due to storm
Anyone with an emergency in the City of Struthers must call 330-740-2370 -- the Mahoning County 911 center

By WKBN Staff
Published: May 1, 2017, 5:26 pm | Updated: May 1, 2017, 5:26 pm
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Current Public Safety Communications Landscape
There are roughly 20,000 Central Offices in the US PSTN
FCC report to Congress:
Vulnerability Assessment and Feasibility of Creating a Back-Up Emergency Communications System

Emergency communications rely on the functioning of the eighty-five percent of the Nation's critical communications infrastructure that the private sector controls.

For example, 911 calls cannot reach a PSAP when the PSTN is compromised or overwhelmed.
FCC report to Congress:
Vulnerability Assessment and Feasibility of Creating a Back-Up Emergency Communications System

Although the Federal government can bring in small scale solutions for temporary patching, speedy and effective recovery is dependent on those closest to the impact zone using deployable equipment, and having plans in place, coordination complete, exercises concluded, equipment caches ready, and back-up power in place.
FCC report to Congress:
Vulnerability Assessment and Feasibility of Creating a Back-Up Emergency Communications System

Further, vulnerabilities can be minimized by isolating single points of failure, identifying robust redundant routes, integrating satellite systems into critical communications infrastructure solutions, where appropriate, and implementing industry best practices.
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E9-1-1
- Complex analog trunking and data network
- Class 5 switch for Selective Router
- Translation based control
- Limited to voice calls
- Data bandwidth 20 char (digits)
- Complex Emergency Gateway Network for VoIP
- Custom interfaces for each service type

NG9-1-1
- Engineered, managed IP networks (ESIbet)
- IP software selective routing function
- GIS and database controls
- Voice, text, video
- Bandwidth unlimited
- Direct handling of Internet sourced calls
- Standard IP interface for all service types
NG 9-1-1

NG9-1-1 Basic Structure
Software and Data Base Controlled

Legend:
- Green: i3
- Red: Data

Database management

Originating Service Providers with Location

LIS

Access

PSAP Call Mgmt

Supportive Data

Using Caller Location, Call Type, and Supportive Data

Supportive & Supplemental Data via IP network

Nat’l Route LoST And ESRP

State Route LoST And ESRP

Validation

Service Routing

Business Rules

Data Rights

Service Routing

Business Rules

ALI Legacy

Valid’n

PS Entity Directory

Vision
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"Sunny Day"

Cyber

Mobile
April 2014 Multistate 911 Outage: Cause and Impact

Just before midnight on Wednesday, April 9, 2014, Pacific Daylight Time (PDT) a 911 call-routing facility in Englewood, Colorado, stopped directing emergency calls to eighty-one 911 call centers (Public Safety Answering Points or PSAPs) in seven states – California, Florida, Minnesota, North Carolina, Pennsylvania, South Carolina, and Washington.

The outage was caused by a software coding error in the Colorado facility, and resulted in a loss of 911 service for more than 11 million people for up to six hours. Over 6,600 calls to 911 never reached a PSAP.
"So called "sunny day" outages are on the rise."

"That's because, as 911 has evolved into a system that is more technologically advanced, the interaction of new and old systems is introducing fragility into the communications systems that is more important in times of dire need."

...call control in legacy 911 networks was primarily performed in a central office switch that was close to the customers it served, whereas IP-supported networks increasing rely on geographically-remote servers and software-based components to support key 911 functions, such as 911 call routing, across multiple states and jurisdictions. Consequently, a 911 outage in an IP-supported network has the potential to affect a much greater number of PSAPs and people, across multiple states...
FCC Chairman Tom Wheeler described the outage report as “terrifying” and "...the transition to all-IP networks is going to create a series of challenges such as this."

David Simpson, chief of the FCC’s public-safety and homeland-security bureau, described 911 reliability as a “unique imperative,...” “This is a call to action.

Together, we must change the trajectory for 911 readiness.”

FCC Commissioner Jessica Rosenworcel said “What is apparent to me is that, as we transition our emergency service systems to next-generation 911, essential elements of our traditional 911 topology are changing. While a more centralized, IP-based system can mean tremendous functionality, it also can mean new vulnerabilities.”
The Night Zombie Smartphones Took Down 911

On a Tuesday night last October in Olympia, Wash., 911 operator Jennifer Rodgers stared at the list of incoming calls on her screen.

 Normally, one or two calls at a time would trickle in at this hour. At 9:28 p.m., they began stacking up by the dozens like lines on an Excel spreadsheet.

 An alarm alerting operators to unanswered 911 calls filled the room. It almost never sounds more than once. Tonight, it was going off constantly.

 Ms. Rodgers had no idea what was happening. People in Olympia, a city of about 50,000 an hour’s drive south of Seattle, and the surrounding county were dialing 911 and hanging up before their calls were answered. Then they were dialing 911 again.
FCC Takes No Enforcement Action Despite Report Finding that Avoidable Failures Led to AT&T Mobility 911 Outage

On May 18, 2017, at the Federal Communication Commission’s (“FCC” or “Commission”) May Open Meeting, the Public Safety and Homeland Security Bureau (“Bureau”) presented its final report on its investigation into the VoLTE 911 outage experienced by AT&T Mobility (“AT&T”) on March 8, 2017 (“the Report”). The Bureau offered a strong critique of AT&T, concluding that the outage could have been avoided had AT&T adopted network reliability best practices previously recommended by an FCC advisory committee. Despite the criticism, however, neither the Bureau nor the Commissioners made any mention of possible enforcement action against AT&T for the outage — at least not at this time.
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FCC
NENA
APCO
FEMA
CSRIC Best Practices

Network Operators, Service Providers, and Public Safety should consider using wireless public or private networks as a backup to dedicated trunks for the 9-1-1 network during periods of network failure. In cases where the ability to deliver 9-1-1 calls to the Public Safety Answering Point (PSAP) through normal routing is interrupted by a failure (not all trunks busy conditions) consider forwarding the call over wireless public, private networks, or satellite-based services to provide an additional alternate path to the PSTN, providing IP multimedia connectivity for next generation networks, or used solely as an alternate call delivery path for the voice component of 9-1-1 calls.
Network Operators and Public Safety should consider deploying dual active 9-1-1 selective routing architectures to enable circuits from the serving end office to be split between two selective routers or Emergency Service Routing Proxies (ESRP) in order to eliminate single points of failure (SPOF) taking diversity between Selective Routers (SR) or ESRP and PSAP into consideration.
CSRIC Best Practices

When a compromise occurs, or new exploits are discovered, Service Providers, Network Operators and Public Safety should perform an audit of available network services to reassess any vulnerability to attack and re-evaluate the business need to provide that service, or explore alternate means of providing the same capability.
NENA Resource, Hazard and Vulnerability Analysis Information Document

NENA Hazard and Vulnerability Analysis Information Document
NENA-INF-019.2-2016 (originally 53-501 & 53-502)
DSC Approval: 08/16/2016
PRC Approval: 08/29/2016
NENA Executive Board Approval: 09/10/2016
Next Scheduled Review Date: 09/10/2018

Prepared by:
National Emergency Number Association (NENA) PSAP Operations Committee, Contingency Planning Subcommittee, Contingency Planning Document Review WG

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NENA PSAP Survivability Information Document

DSC Approval: 10/04/2016
PRC Approval: 12/23/2016
NENA Executive Board Approval: 01/12/2017
Next Scheduled Review Date: 01/12/2019

Prepared by:
National Emergency Number Association (NENA) PSAP Operations Committee, Contingency Planning Subcommittee, Contingency Planning Document Review WG

Published by NENA
Printed in USA
NENA Emergency Services
IP Network Design for NG9-1-1
(NID)

NENA Emergency Services IP Network Design for NG9-1-1
NENA 08-506, Version 1, December 14, 2011
Development Steering Council Approval Date, November 1, 2011
Standards Advisory Committee Approval Date, November 22, 2011
NENA Executive Board Approval Date, December 14, 2011
Prepared by:
National Emergency Number Association (NENA) VoIP/Packet Technical Committee – FSIND WG
Published by NENA
Printed in USA
NENA: ESIND

The emphasis on “no single point of failure” in 9-1-1 applies to all ESI nets. Some considerations that should be addressed include:

- Physical entrance facilities (dual entrance, where feasible and cost effective)
- Backhaul facility diversity
- Circuit diversity
- Network diversity
Continuity Guidance Circular 2 (CGC 2)
Continuity Guidance for Non-Federal Governments:
Mission Essential Functions Identification Process
(States, Territories, Tribes, and Local Government Jurisdictions)
FEMA P-789 / October 2013
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Good plan makes a bad day a good recovery

True but I still puckered a little

Any idea of the cause?
Ethernet switch died and lost configuration

Switches and Routers are the weakest link

Makes every path only 94% available

Correct. Good thing only lost 1/2 room, have it split

Smart config

Teleira NOC is monitoring your status
Backhaul Diversity
Backhaul Diversity & Control
IP Virtual Public Safety PBX
Disaster Field Deployment
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