WISCONSIN
INTEROPERABILITY
SEAMLESS STATEWIDE PUBLIC SAFETY RADIO COMMUNICATIONS

TONY EVERS,
Governor

MATT JOSKI,
Chairperson
Interoperability Council

August 8, 2019

To whom it may concern:

As Chairs of Wisconsin's Interoperability Council and 9-1-1 Subcommittee, we are excited to share with you the 2019 Statewide 9-1-1 System Assessment report, as authorized by Wis. Stat. § 256.35(3s)(d)(5). This report was developed in coordination with the Wisconsin Department of Military Affairs and included an extensive survey of public safety answering points (PSAPs)/9-1-1 centers across the state.

We would like to thank the 9-1-1 community, Wisconsin EMS Association, and the Department of Health Services for taking the time to provide and share invaluable data on current 9-1-1 operations in the state, as well as 911 Authority, LLC for their essential work in drafting this report.

This report was reviewed and approved by the Wisconsin Interoperability Council and 9-1-1 Subcommittee and provides an overall representation of 9-1-1 in the state and recommendations for moving the state forward with NextGen9-1-1.

Please feel free to contact us with any questions you may have.

Respectfully,

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Wisconsin 9-1-1 Telecommunications System Assessment Report

As required by Wis. Stat. § 256.35(3s)(d)(5)

submitted to the

Wisconsin 9-1-1 Subcommittee and Interoperability Council

On behalf of the

Wisconsin Department of Military Affairs

Office of Emergency Communications

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Executive Summary

Wisconsin Statute § 256.35(3s)(d) established that it is the duty of the Wisconsin (WI) 9-1-1 Subcommittee to conduct a statewide 9-1-1 telecommunications system assessment. This document is the Wisconsin 9-1-1 Telecommunications System Assessment Report (hereinafter "Report") drafted to meet and satisfy the statutory requirements of the WI 9-1-1 Subcommittee.

As required by statute, this Report provides an analysis of 9-1-1 and Public Safety Answering Point (PSAP) operations across the state of Wisconsin. The crucial information collected and analyzed for this Report is necessary for the WI 9-1-1 Subcommittee and the larger community to make informed decisions related to the PSAP transition from legacy 9-1-1 technology to NG9-1-1 technology. The findings of this Report will be used to inform future NG9-1-1 planning, procurement, transitions, deployments, and operations in Wisconsin.

In November 2018, the Wisconsin Department of Military Affairs' (DMA) Office of Emergency Communications (OEC) entered into a contract with 911 Authority, LLC to assist the OEC with tasks related to NG9-1-1. Task 3 of the contract requires the 911 Authority team to work in collaboration with OEC staff and the WI 9-1-1 Subcommittee to perform the data collection, PSAP outreach, and data analysis necessary to draft and complete the Report on behalf of the WI 9-1-1 Subcommittee as required by statute.

The methodology for conducting the Statewide 9-1-1 Telecommunications System Assessment (hereinafter "Assessment") consisted of the following:

1. A review of existing documentation related to the 9-1-1 operating environment in WI
2. Developing a PSAP survey tool, in coordination with the WI 9-1-1 Subcommittee, for data collection and report content
3. Conduct nine onsite PSAP visits to pilot the survey and quality check the data collection
4. Conduct regional meetings across the state to communicate the goals and objectives of the assessment and answer any questions related to the survey or the assessment

The work for this Report began in November 2018 with a review of existing documentation and the development of the PSAP survey tool. The PSAP survey tool was developed and refined with input by the WI 9-1-1 Subcommittee. Work progressed with PSAP site visits and trials of the PSAP Survey in December 2018, followed by regional PSAP meetings and additional PSAP site visits in January 2019. The Survey was distributed to the PSAPs in February 2019 with most responses received by March 2019. Analysis and report writing followed with the final Report submitted to the WI 9-1-1 Subcommittee in June 2019.

The estimates and expectations at the beginning were that as many as 109 PSAPs could respond to the Survey based on 2016 data. However, the actual number of PSAPs in the state based on the 2019 data collected is now estimated at 122, including local, state, and federal agencies. In all, 108 PSAPs responded to and provided information for the WI PSAP Survey. The high number of returns on the Survey demonstrates an excellent response rate and an almost unanimous response is virtually unheard of with this kind of survey work with PSAPs. The level of response and engagement indicates the level of interest in NG9-1-1 amongst the PSAPs in Wisconsin. The table below summarizes some key measurements related to the 9-1-1 telecommunications infrastructure in Wisconsin.

9 1 1 in Wisconsin Quick Facts	
Wisconsin PSAPs (Responded/Estimated Actual)	108/122
9-1-1 Call Answering Positions	641
9-1-1 Trunks	653
9-1-1 Staff	2,115
First Responder Agencies Served (Fire, Police, EMS, includes duplication)	2,288
9-1-1 Calls (annual approximate as reported)	3,000,000
Total Calls handled by PSAPs (annual approximate as reported)	9,000,000

Overall Findings and Conclusions

- Wisconsin PSAPs are fully engaged and ready to begin the transition to NG9-1-1. The response to the Survey and the amount of data provided by the PSAPs is outstanding and will serve the state well as the transition to NG9-1-1 takes place.
- The vast amount of data collected for this Report establishes an excellent foundation for the analysis presented in this Report. While the data represents a snapshot in time and the accuracy of specific information will decline over time, the level of information is appropriate, valid, and necessary to inform an orderly transition to NG9-1-1 in Wisconsin.

Funding and Regulatory Findings (Section 2):

- The current legislation relative to 9-1-1 in Wisconsin needs modification, making the language more inclusive of NG9-1-1 and to better enable the transition to NG9-1-1 in Wisconsin. (Page 13)
- The current governance structure in Wisconsin is appropriate for the beginning stages of transitioning to NG9-1-1, but there may need to be additional forms of governance, authorities, and policies developed as the PSAPs transition to and operationalize NG9-1-1. (Page 18)
- Funding for the operation of PSAPs in Wisconsin occurs at the local level and is supported by local general funds. Current revenues collected to fund legacy 9-1-1 (i.e. bill and keep) will not support the costs associated with operating a NG9-1-1 system serving all the PSAPs across the state. (Page 26)
- Possible funding sources available to fund the transition to and operation of a NG9-1-1 system include statutory allocation to DMA/OEC, federal NG9-1-1 matching grants (if available), allocations from the Police and Fire Protection fund or a return to a 9-1-1 surcharge, and allocations from local general funds. (Page 27)

- None of the potential funding methods on their own are capable of paying for and supporting the ongoing operation of a NG9-1-1 system serving all the PSAPs in Wisconsin. This could result in future funding shortfalls that could jeopardize the NG9-1-1 service to the PSAPs. (Page 27)
- The State should identify a sustainable funding model for the implementation and operation of the Wisconsin statewide ESInet. (Page 27)
- Funding 9-1-1 by allocation is not consistent with other states' approaches to supporting the transition to and operation of a NG9-1-1 system. The predominant NG9-1-1 funding model relies on a dedicated fee on user devices or types of devices that use the 9-1-1 system. According to the FCC's 10th Annual 9-1-1 Fee Report to Congress, 35 states, the District of Columbia, and Puerto Rico reported using some portion of 9-1-1 fees collected to fund NG9-1-1 projects in 2017. (Page 28)

Current System Findings (Section 3):

- 9-1-1 in Wisconsin is consistent with other states and jurisdictions when comparing the numbers for population, PSAPs, call volumes, positions, staff, etc. (Page 37)
- There is a large patchwork of different systems, service providers, capabilities, and resources across the state making coordination and communications imperative as the transition to NG9-1-1 takes place. (Page 46)
- The current 9-1-1 telecommunications infrastructure in Wisconsin supports the PSAPs in Wisconsin but is becoming rapidly obsolete and will not support NG9-1-1 technology and capabilities. (Page 47)
- The current system has created operational scenarios at PSAPs that may no longer be necessary when operating on a NG9-1-1 system. Examples include 9-1-1 call overflow, backup PSAPs, and 9-1-1 call transfers. Removing these will lead to better service, reduced costs, and improved response at the local level. (Page 48)
- About 50% of the PSAPs are prepared for a transition to NG9-1-1 when analyzing the age and type of 9-1-1 Call Handling Equipment (CHE, also known as Customer Premise Equipment (CPE)) in operation today based on the survey results. Of the remaining 50% that are not ready, 29 reported plans to replace their CHE/CPE system with a NG9-1-1 "capable" system in the next 12-24 months, which would bring the new percentage of PSAPs prepared for the transition to around 75%. (Page 52)

NG9-1-1 Findings (Section 4):

- Operating a NG9-1-1 system will lead to better service, reduced costs (after the transition is complete), and improved response at the local level by reducing the need for backup PSAPs, 9-1-1 call transfers, and fast busy call routing scenarios which can all delay response to incidents. (Page 56)
- In some PSAPs, wireless 9-1-1 calls are handled differently than wireline 9-1-1 calls and causes some wireless 9-1-1 calls to be handled twice. NG9-1-1 with dynamic, location-based routing of 9-1-1 calls will eliminate the duplication of work and route 9-1-1 calls to the PSAP that is supposed to answer that 9-1-1 call. (Page 59)
- The ease with which a NG9-1-1 system can dynamically route calls between PSAPs will quickly highlight

differences in training and protocols used by PSAPs across the state. The survey results indicate a high level of investment at the local level for both basic telecommunicator and protocol-specific training like Emergency Medical Dispatch (EMD). Continued investment in standardized training and protocols with a statewide approach would maximize on these local investments and help provide more uniform service across the state in a NG9-1-1 environment. (Page 60)

- Accurate Geographic Information Systems (GIS) data is vital to the operation of any NG9-1-1 system at both the state and local level. The level of investment in GIS data at the local level in Wisconsin, as evidenced by the survey results, is outstanding and will be needed as the transition to NG9-1-1 occurs. (Page 64)
- A NG9-1-1 system, when combined with accurate GIS data at the local level, will greatly reduce the duplication of work and route 9-1-1 calls to the PSAP that is supposed to answer that 9-1-1 call. (Page 69)
- In order to leverage the investment in GIS at the local level and contribute to the ongoing operation of the NG9-1-1 system, a planned, coordinated NG9-1-1 GIS data sharing process and procedure for all PSAPs will be required. (Page 70)

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1. 9-1-1 Assessment Objectives and Methodology

1.1 Statewide 9-1-1 Telecommunications System Assessment Objectives

Next Generation 9-1-1 (NG9-1-1) refers to the ability to transmit, receive, process, transfer, dispatch, use, and store both voice and data (in the form of pictures, videos, text messages, and incident information) associated with a 9-1-1 call or request for emergency assistance. The NG9-1-1 system that will be implemented in Wisconsin will contain the same functions of the current analog system, such as reliability, while providing for greater accessibility, interoperability, and a more efficient use of 9-1-1 resources. NG9-1-1 will enable the transfer of 9-1-1 calls between geographically dispersed PSAPs, increase sharing of data and resources to improve emergency response, and improve coordination and partnerships within the 9-1-1 community.

Wisconsin Statute § 256.35(3s)(d) established that it is the duty of the WI 9-1-1 Subcommittee to conduct a statewide 9-1-1 telecommunications system assessment, in addition to other activities related to NG9-1-1 planning and implementation. This Report satisfies the statutory requirement of the WI 9-1-1 Subcommittee.

As required by statute, this Report provides an in-depth analysis of 9-1-1 and PSAP operations across the state of Wisconsin. The crucial information collected and analyzed for this Report is necessary for the WI 9-1-1 Subcommittee to make informed decisions related to the PSAP transition from legacy 9-1-1 technology to NG9-1-1 technology and operations.

The primary goals and objectives for conducting a Statewide 9-1-1 Telecommunications System Assessment are as follows:

1. Review existing DMA/OEC documentation for assessment
2. Prepare a PSAP system assessment survey tool and provide training for PSAPs in completing the survey information
3. Review the Regulatory and Funding framework for Wisconsin
    a. Develop a complete list of both primary and secondary PSAPs and determine NG9-1-1 readiness
    b. Identify statutory and regulatory impacts (local, state, and federal) related to the implementation of NG9-1-1
    c. Identify current and other possible funding sources (local, state, and federal) for implementing a statewide ESInet and NG9-1-1 and compare to other states
    d. Identify potential costs to both state and local stakeholders
4. Document Current 9-1-1 Network Capability
    a. Analyze the current equipment and software, as well as changes needed for the implementation of the ESInet at the state and PSAP levels (including CPE, servers, workstations, ANI/ALI controllers, GIS, CAD, etc.)

b. Analyze the existing and necessary upgrades or solutions to GIS/mapping data for implementation of NG9-1-1 and identification of the transition process from the master street address guide required for NG9-1-1 and how geocoding would integrate in the routing of NG9-1-1
c. Identify issues related to system security and redundancy
d. Provide recommendations for the planning, development, phased-in implementation, and management of NG9-1-1 and the deployment, interconnection, and management of the ESInet, including, but not limited to, necessary technological upgrades, the timeline, cost of each phase of implementation, and organizational structures with authority to oversee the recommended options

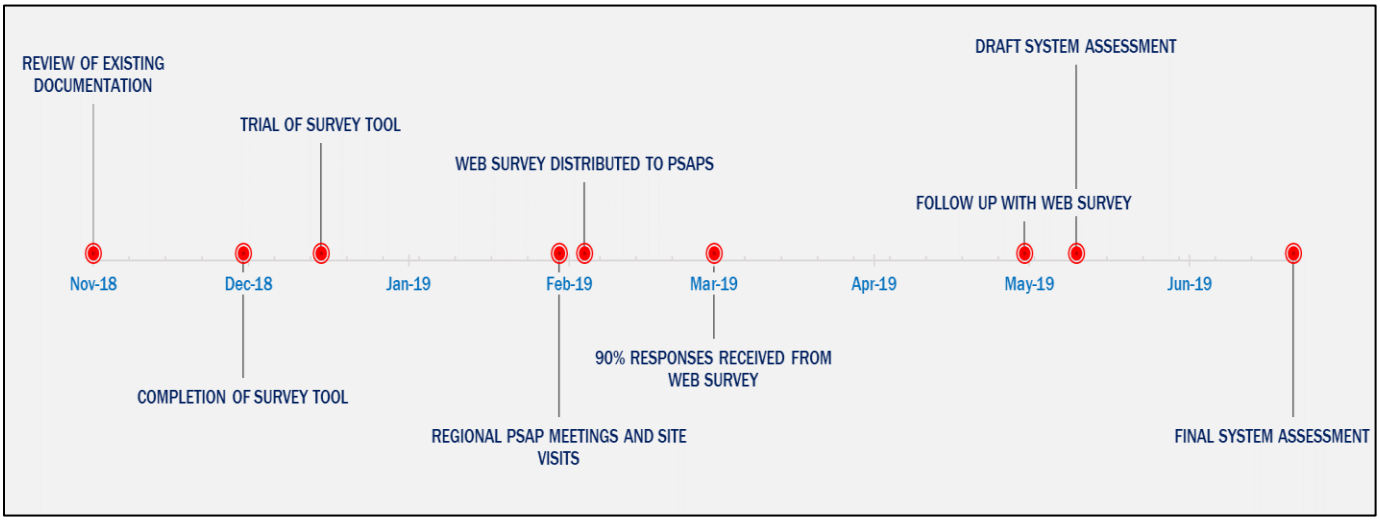
5. Deliver final 9-1-1 Telecommunications System Assessment Report

1.2 Assessment Methodology

The methodology for conducting the statewide Assessment consisted of the 911 Authority team working in collaboration with OEC staff and the WI 9-1-1 Subcommittee on the following:

1. A review of existing documentation related to the 9-1-1 operating environment in WI
2. Developing a PSAP survey tool for data collection and report content
3. Conduct nine onsite PSAP visits to pilot the survey and QA/QC the data collection
4. Conduct regional meetings across the state to communicate the goals and objectives of the assessment and answer any questions related to the survey or the assessment

A basic timeline for the development of the survey tool and the Report is presented below:



1.2.1 Review of Existing Documentation

The 911 Authority team reviewed existing documentation and used these documents for comparison throughout the development of this Report. Specific documentation included:

- WI Statewide NG9-1-1 Plan, dated 05/11/2017
- Interoperability Council's NG9-1-1 White paper, dated 10/03/2016
- 2016 Department of Administration PSAP survey data
- Healthcare Emergency Readiness Coalitions (HERC) Telecommunicator CPR survey
- 2016/2017 WI State Telecommunications Association maps
- DMA/OEC Interoperability Report 12/2018
- DMA NG9-1-1 Budget Considerations Paper 02/2019

1.2.2 Online PSAP Survey

A PSAP Survey tool was developed and designed with input from OEC staff and the WI 9-1-1 Subcommittee. The questions contained in the survey tool primarily focused on PSAP specific information and topics or areas relevant to the Report, including:

Statewide

- Identify ALL primary and secondary 9-1-1 centers/PSAPs
- Current status of Wisconsin 9-1-1 centers relative to NG9-1-1 readiness/capability
- Current 9-1-1 network capabilities
- Identify projects that may impact the implementation of NG9-1-1
- Identify 9-1-1 funding sources
- Identify potential costs to both state and local stakeholders

Local PSAP

- Current status of Wisconsin 9-1-1 centers relative to NG9-1-1 readiness/capability
- Identify existing broadband and telephony infrastructure
    - Trunking
    - Routers
    - Broadband
- Catalog existing equipment and software (CPE, Radio, Recorders, etc.)
    - Legacy
    - NG9-1-1 capable or enabled
- GIS capabilities
    - Current and possible future end-user services and applications

The PSAP Survey tool consisted of 47 questions. A draft of the Survey was shared with the WI 9-1-1 Subcommittee at the December 2018 meeting. The PSAP Survey was distributed to over 200 contacts in WI on February 1, 2019 with a closing date of March 1, 2019. In total, 108 PSAPs responded and provided information for this Report. A copy of the Survey can be found in Appendix B of the Report.

1.2.3 PSAP Site Visits

The 911 Authority team, in cooperation with OEC staff, conducted nine onsite PSAP visits to pilot the Survey and QA/QC the data collection. The following agencies took part in the site visits:

- Dane County Public Safety Communications
- Green County Sheriff's Office
- Wisconsin Dells Police Department
- Sawyer County Sheriff's Office
- Polk County Emergency Communications
- Taylor County Sheriff's Office
- Columbia County Sheriff's Office
- City of Brodhead Police Department
- City of Middleton Police Department

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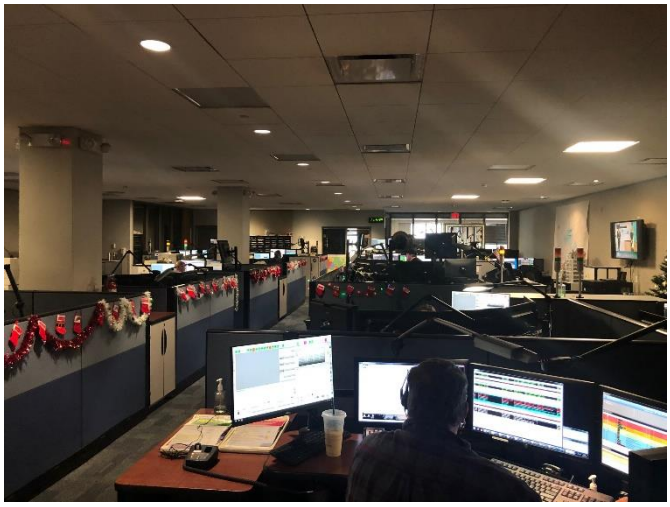


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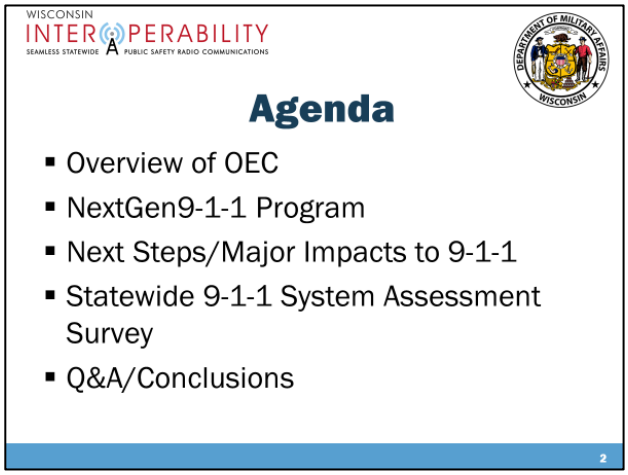
1.2.4 Regional PSAP Meetings

The 911 Authority team, in collaboration with OEC staff, developed presentations for a series of regional PSAP meetings and coordinated outreach with the PSAPs.

In all, six regional meetings were planned; due to weather the week of January 28, 2019, some of the onsite meetings were canceled and conducted via webinar. The agenda for the regional PSAP meetings is provided below. The meetings were a combination of in-person presentations supported by an audio bridge and a webinar for those who could not attend in-person. A session recording was made available for those that could not attend any of the sessions. The team conducted a total of four onsite regional meetings and three webinars during the week.



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The schedule for the regional meetings is provided below to demonstrate the level of outreach dedicated to the data collection that was necessary for this Report.

Regional Meeting Schedule Week of January 28th			
Date	Start/End Time	Meeting	Location
1/28/2019	0900-1100	NW Regional PSAP Meeting	Spooner Fire Hall, 1407 N Front St, Spooner, WI 54801
1/29/2019	0900-1100	WC Regional PSAP Meeting	Eau Claire County Jail, 710 2nd Ave, Eau Claire, WI
1/30/2019	0900-1100	NE Regional PSAP Meeting	Marathon County Training Center, 7255 Stewart Ave, Wausau, WI 54403 ***Site meeting canceled due to weather emergency; webinar held with EC region 1/31/19***
1/31/2019	0900-1100	EC Regional PSAP Meeting	Grand Chute Fire Department, 2250 Grand Chute Blvd., Grand Chute, WI 54913 ***Physical site meeting canceled due to weather emergency; webinar held instead***
2/1/2019	0900-1100	SE Regional PSAP Meeting	New Berlin City Hall, 3805 S Casper Dr, New Berlin, WI, City Council Chambers
2/1/2019	0900-1100	SW Regional PSAP Meeting	SWTC, 1800 Bronson Blvd. Fennimore, WI 53809

The regional meetings were very well attended in both physical and virtual form. The turnout by the PSAP community and the level of cooperation exhibited in the logistics and coordination required for the meetings speaks volumes to the commitment of the 9-1-1 community in Wisconsin. This is exactly the level of engagement and commitment required for a successful transition to NG9-1-1.

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2. Regulatory and Funding Framework for Wisconsin

2.1 Legislative and Regulatory Review

The growth in communications technology is forcing public safety officials at every level of government to change the way they operate in order to provide equivalent 9-1-1 services to constituents. To support these trends, PSAPs must migrate to a platform that enables new and emerging communications services and devices to access 9-1-1. As Next Generation 9-1-1 (NG9-1-1) is implemented, and multiple government units consider collaborating with capital expenditures, funding. and governance, changes to existing laws and administrative rules will need to be considered.

As part of this Report, 911 Authority was charged with reviewing existing general statutes and administrative rules and make recommendations for amendments that enable the State and local authorities to transition to NG9-1-1. It is important that the statutes and administrative rules for basic and sophisticated systems remain relevant during the transition.

The 911 Authority reviewed Wisconsin's statutes and administrative rules that are relevant to communication services and 9-1-1. The review included the following:

- Wis. Stat. § 256.35 Statewide emergency services number
- Wis. Stat. § 15.315 Same; councils
- Wis. Stat. § 196.025(6) Police and Fire Protection Fee
- Wis. Stat. § 66.0101 Home Rule; Manner of Exercise
- WIS. ADMIN CODE § PSC 165 Standards for Telecommunications Service
- WIS. ADMIN CODE § PSC 168 Telecommunications Resellers and Resale
- WIS. ADMIN CODE § PSC 173 9-1-1 Emergency Telecommunications Service
- WIS. ADMIN CODE § PSC 179 Telecommunications Dispute Resolution

Wis. Stat. § 256.35 *et seq.*, establishes the statutory provisions and requirements for 9-1-1 service at the state and local levels. Initially established in 1977, the enabling legislation has been amended over the years to meet the needs of disparate legacy systems and funding at the local level.

Modernization of Wis. Stat. § 256.35 will be required to facilitate the state's transition to the NG9-1-1 environment. An important component in modernizing state law for NG9-1-1 purposes is the involvement of stakeholders at the state and local level. Lawmakers will need to better understand the change from service being provided to a PSAP by a local system service provider to a single statewide ESInet under the jurisdiction of a state agency. Stakeholder involvement is key to any legislative effort. For NG9-1-1 purposes, stakeholders include: PSAP representatives, public safety officials, local elected officials and their associations, and industry partners. Successful legislation can be achieved when sound public policy is presented in this "team"

environment.

Legislative considerations should include:

- Updating definitions and including new terms to reflect NG9-1-1
- Creating a single statewide 9-1-1 program in statute
- Clearly identifying the entity's powers, duties, and responsibilities for 9-1-1 service
- Establishing the Wisconsin ESInet as the 9-1-1 delivery network for all jurisdictions
- Funding considerations to address gaps

2.1.1 Updating Definitions and Including New Terms to Reflect NG9-1-1

It is recommended that definitions in Wis. Stat. § 256.35 be amended to facilitate the State's transition to NG9-1-1. Using industry-accepted terms will allow all stakeholders to better understand the State's meaning and use of technology for 9-1-1. The transition to NG9-1-1 is considered a "journey" and it is important that state statutes and administrative rules be inclusive of all 9-1-1 services, i.e. basic, sophisticated (enhanced), next generation, and any new 9-1-1 services that are yet to be developed. As such, other states have defined 9-1-1 related terms in a way that evolves with the technology.

2.1.1.1 Communications Services

There is no current statutory definition for "communications services". The following is suggested language for defining 9-1-1 services as a communications service:

Communications service means any service that:

(1) uses telephone numbers or IP addresses or their functional equivalents or successors;

(2) allows access to, or a connection or interface with, a 9-1-1 system through the activation or enabling of a device, transmission medium, or technology that is used by a customer to dial, initialize, or otherwise activate the 9-1-1 system, regardless of the particular device, transmission medium, or technology employed.

Using terms such as "functional equivalents" or "successors" provides an opportunity for future paths that could lead to technologies beyond NG9-1-1.

2.1.1.2 Automatic Location Identification (ALI)

The current definition for ALI under Wis. Stat. § 256.35(1)(a) is as follows:

"Automatic location identification" means a system which has the ability to automatically identify the address of the telephone being used by the caller and to provide a display at the central location of a sophisticated system."

The National Emergency Number Association (NENA) defines ALI as "the automatic display at the PSAP of the caller's telephone number, the address/location of the telephone, and supplementary emergency services information of the location from which a call originates".

The definition of ALI in the current statute should be updated to reflect the NENA definition which defines ALI in the context of today's technology.

2.1.1.3 Public Safety Answering Point (PSAP)

PSAP is currently defined under Wis. Stat. § 256.35(1)(gm) as, *"a facility to which a call on a basic or sophisticated system is initially routed for response, and on which a public agency directly dispatches the appropriate emergency service provider, relays a message to the appropriate emergency service provider or transfers the call to the appropriate emergency services provider".*

The National Emergency Number Association (NENA) Master Glossary defines a PSAP as, "an entity responsible for receiving 9-1-1 calls and processing those calls according to a specific operational policy".

It is recommended that the current statute be updated to reflect the NENA definition. This change eliminates the terms "basic" and "sophisticated" and simply states "9-1-1 calls" which includes all communication types used today and in the future.

2.1.1.4 Statewide 9-1-1 Program in Statute

Due to the interconnected and shared nature of NG9-1-1, implementation is more complex and requires collaboration among all the stakeholders in a way that was not necessary in the past. Policy and governance issues cannot be addressed by individual local jurisdictions or individual 9-1-1 authorities. NG9-1-1 requires establishing a collaborative governance framework that will enable such a shared, interconnected, and interoperable system of systems.

It is important for policy makers at every level of government to recognize that NG9-1-1 service requires a statutory and regulatory framework that assures the continued availability, quality, consistency, and sustainability of enhanced 9-1-1 service throughout the state. Continuing to support a statewide governance body that is representative of the affected stakeholders, as well as establishing a statewide entity with central oversight over the program and system in statute, is essential to the success of a statewide NG9-1-1 system.

In 2017, the legislature created a 9-1-1 Subcommittee of the Interoperability Council (IC), attached to the Department of Military Affairs. The WI 9-1-1 Subcommittee consists of nineteen members representing a diverse group of stakeholders. In accordance with Wis. Stat. § 256.35(3s)(d), the Subcommittee's statutory authority provides for "advisory" actions.

In the 2018 Interoperability Report authored by DMA in coordination with the Interoperability Council, WI 9-1-1 Subcommittee, and members of the public safety stakeholder community, there were several recommendations made that are critical to the success of any Statewide 9-1-1 Program.

One recommendation was to define "Statewide Public Safety Interoperable Communication System(s)" under Wis. Stat. § 323.29(1).[1] The recommendation to amend Wis. Stat. § 323.29(1) to define "statewide public safety interoperable communication system" in the plural would expand the responsibilities of the IC and the WI 9-1-1 Subcommittee for governance of the NG9-1-1 system. For further recommendations to improve interoperable emergency communications in Wisconsin including NG9-1-1, please reference the 2018 Interoperability Report.

In addition, the following should be added as statutory duties of DMA/OEC, in consultation with the IC and 9-1-1 Subcommittee:

- Reporting 9-1-1 data and statistics to local, state, and federal agencies
- Fiscal Matters related to 9-1-1
- Grants for PSAPs
- 9-1-1 related training
- Standard Setting (e.g. call routing policies)

2.1.1.5 Establish the Wisconsin ESInet as the Single Statewide 9-1-1 ESInet

The current 9-1-1 network in Wisconsin is a patchwork of separate networks maintained by multiple Incumbent Local Exchange Carriers (ILECs). Competitive Local Exchange Carriers (CLECs), wireless carriers, and Voice over Internet Protocol (VoIP) providers connect to various Selective Routers owned by the ILECs to provide E9-1-1 service to each PSAP. The design, while robust and reliable, continues to be a financial burden to local government and is rapidly becoming obsolete. The implementation of a single statewide NG9-1-1 ESInet provides the opportunity for 9-1-1 services to be purchased in an economies of scale environment.

In the past, 9-1-1 in Wisconsin has been provided through a contractual relationship between a local government and the incumbent local exchange carrier. In several jurisdictions, local government is required to have a cooperative agreement with one or more local exchange carrier. These cooperative agreements are limited in nature, oftentimes only related to 9-1-1 call delivery, Automatic Number Identification (ANI)/Automatic Location Identification (ALI) delivery, and cost recovery. The role of oversight lies with the Public Services Commission whose only responsibility is to review the terms and rates. The Public Service Commission does not have regulatory oversight over 9-1-1 services or the fee. The fee for cost recovery is established by ordinance at the local level. Local officials reported that many of their cooperative agreements have expired and their answering equipment is beyond end-of-life, but it still works. It is important to understand that their "end-of-life" answering equipment works in the legacy environment but will not be compatible for NG9-1-1 services.

[1] Interoperability Report 2017 Wisconsin Act 59 Dated December 27, 2018 - https://dma.wi.gov/DMA/divisions/oec/library/2019/DMA_Interoperability_Legislative_Report2018.pdf

The extent to which a statewide NG9-1-1 system is implemented varies across the country, depending upon the authority or restrictions imposed by state law or regulatory rules. While statewide systems may be permissible by statute or administrative rule, additional considerations may include the availability of funding or public safety preference at the state or local level. In some jurisdictions outside of Wisconsin, the state program provides the ESInet, core services, call handling equipment, database, mapping, etc. In other jurisdictions, the state program limits their offering to the ESInet and core services only. As new communication services are offered for 9-1-1, such as "text to 9-1-1", it is up to the state program and public safety stakeholders whether such features are offered statewide as part of the services.

The Wisconsin ESInet will likely be presented to local officials as an opt-in or opt-out decision due to the current home rule legislation in the state. This structure will continue a fragmented deployment of 9-1-1 services, reduce interoperability, and potentially increase costs at the local level. PSAPs who choose to continue to operate in a "legacy" environment will experience fewer service options and increased costs.

As part of the modernization of Wis. Stat. § 256.35, lawmakers should consider the statewide 9-1-1 system as a statewide concern and establish the ESInet as the 9-1-1 call delivery system for every PSAP. The State's purchase of ESInet services as the sole source creates a potential savings to local government for legacy charges. The ESInet will also limit the number of connection points and infrastructure requirements of communication providers doing business in the state.

A single statewide authority who contracts for and pays for 9-1-1 call delivery services creates statewide redundancy, efficiency of operation, and potential cost savings.

Interoperability from the local public safety official to the nation's most advanced first responder is the highest priority in providing public safety response. NG9-1-1 provides the link between the citizen, the PSAP, and the first responders by utilizing current technologies. Interoperability at that level requires coordination and collaboration which crosses many jurisdictional boundaries and therefore requires state level coordination. Constitutional and statutory home rule autonomy in Wisconsin is applicable to basic and sophisticated 9-1-1 systems and could foster a fragmented network deployment if applied to NG9-1-1. A NG9-1-1 system can be a statewide concern in which legislative action applies uniformly to every community in the state.

2.2 Wisconsin NG9-1-1 Governance Planning

To ensure proper management of the transition to and operation of NG9-1-1 statewide, Wisconsin is working to establish NG9-1-1 related governance requirements. Establishing a successful governance model will help to achieve the proper level of coordination it takes to transition to and operate a NG9-1-1 system successfully. A state-level governance structure should encompass leadership, organization, and stakeholder representation. Wisconsin is planning to coordinate the transition to and operation of a NG9-1-1 system with the support and cooperation of all necessary stakeholders throughout the state. A strong governance model will allow the state to establish the roles and responsibilities related to the system and to establish a process for executing shared responsibilities.

2.2.1 Current Program Structure

The Wisconsin Department of Military Affairs (DMA) administers the Office of Emergency Communications (OEC) which is responsible for the following program areas:

- Wisconsin Interoperable System for Communications (WISCOM)
- Nationwide Public Safety Broadband Network Initiative (FirstNet)
- NG9-1-1
- Land Mobile Radio (LMR)/Interoperability

2.2.1.1 The Interoperability Council and the WI 9-1-1 Subcommittee

Under Wis. Stat. § 323.29(3)(a), the OEC also provides staff support to the State Interoperability Council, its subcommittees, and workgroups. The Interoperability Council has four subcommittees: the 9-1-1 Subcommittee, WISCOM Subcommittee, NPSBN Subcommittee, and the LMR Subcommittee. Wis. Stat. § 323.29(3)(a) states that DMA shall "provide staff support for the council and oversight of the development and operation of a statewide public safety interoperable communication system."

Wisconsin's Interoperability Council (IC) operates in an advisory capacity to the DMA and shares statutory responsibilities for interoperable communications with DMA/OEC. Traditionally, interoperability has focused on Land Mobile Radio (LMR) systems which provide "voice" communications to first responder agencies including PSAPs. A NG9-1-1 system changes the dynamics of interoperability to include "voice and data" being shared between the general public, first responder agencies, and PSAPs.

In 2017 Wisconsin Act 59, the legislature established the 9-1-1 Subcommittee which serves as a subcommittee of the Interoperability Council. The Subcommittee was given limited statutory authority as it relates to the NG9-1-1 system.

Under Wis. Stat. § 15.315, there are nineteen voting members of the WI 9-1-1 Subcommittee with most appointed by the Governor. These members represent various stakeholder associations and industry partners. The WI 9-1-1 Subcommittee consists of the following voting members:

- One member appointed by the Adjutant General
- An individual recommended by an association of Wisconsin cities, villages, or towns
- An individual recommended by an association of Wisconsin counties
- An individual recommended by a Wisconsin association, or a Wisconsin chapter of an association, that promotes a universal emergency telephone number system
- An individual recommended by an association of Wisconsin county sheriffs
- Two individuals, each of whom represents a different commercial mobile radio service provider, as defined in Wis. Stat. § 196.01 (2g), operating in Wisconsin: one serving a primarily regional market and one serving a national market
- Two individuals recommended by a Wisconsin association, or a Wisconsin chapter of an association, of

public safety communications professionals
- Two individuals recommended by an association of Wisconsin telecommunications providers, as defined in Wis. Stat. § 196.01 (8p), each of whom represents an incumbent local exchange carrier
- An individual who represents a competitive local exchange carrier
- An individual who represents a voice over Internet protocol provider
- A police chief recommended by an association of Wisconsin police chiefs
- A fire chief recommended by an association of Wisconsin fire chiefs
- An individual recommended by a Wisconsin association that promotes emergency management
- An individual who represents a video service provider, as defined in Wis. Stat. § 196.01 (12r)
- An individual recommended by a Wisconsin association of emergency medical service providers
- An individual recommended by an association of land information professionals

In making appointments to the WI 9-1-1 Subcommittee, the Governor must consider the geographical diversity and representation of urban and rural interests.

The WI 9-1-1 Subcommittee has been statutorily charged with advising DMA on aspects related to Next Generation 9-1-1 emergency services IP network contracts and implementing NG9-1-1 in Wisconsin. The statutory creation of the WI 9-1-1 Subcommittee shows state commitment to building a governance model to aid in the success of NG9-1-1 as well as provides a vehicle to achieve this goal. In late 2016, the NextGen9-1-1 Workgroup was formed to assist in planning for the deployment of NG9-1-1 throughout Wisconsin by drafting a strategic plan. The 2017 statutory creation of the WI 9-1-1 Subcommittee is a step towards a NG9-1-1 governance model that is inclusive and fosters stakeholder buy-in, participation, and maintenance of a successful transition to and long-term success of a statewide NG9-1-1 system.

As the state considers implementation, operation, and oversight of a NG9-1-1 system, additional consideration must be given to a strong governance structure to support the many aspects of the program. Local government officials, public safety agencies, and communication service providers will all depend upon the State 9-1-1 Office (currently DMA/OEC) and governance structure to ensure a successful statewide program.

The governance structure for a statewide NG9-1-1 system exists today, but statutory authority is limited. Legislative changes should be considered to include the NG9-1-1 system as part of interoperable communications; provide authority to the Interoperability Council, WI 9-1-1 Subcommittee and the Office of Emergency Communications to implement, operate, and manage the Statewide 9-1-1 Program. This statutory authority would provide a solid foundation for the state to implement NG9-1-1.

2.2.2 NG9-1-1 Governance Vision

The State of Wisconsin is planning to deploy a statewide ESInet with Next Generation Core Services (NGCS). Not only will the statewide NG9-1-1 implementation and maintenance approach be cost efficient for PSAPs, it

will also streamline implementation as the coordination will be handled at the state level. Coordination at the state level will help to ensure the highest level and uniformity of service throughout the state. It will also ensure the security and reliability of a NG9-1-1 system. Statewide coordination can also focus efforts, maintain priorities, help ensure the achievement of NG9-1-1 goals in a timely manner, and provide every resident in the state with equal access to the NG9-1-1 system. The WI 9-1-1 Subcommittee can take the lead by leveraging their organization and planning resources. An efficient and effective governance structure is key to establishing an interoperable system of systems that will be growing and changing over time.

2.2.2.1 State-level Coordination

The NG9-1-1 environment is a system that allows resources to be shared which will provide the highest level of emergency response and will require centralized state-level coordination. With support from the OEC, the WI 9-1-1 Subcommittee should plan, coordinate, and implement NG9-1-1. Additionally, the WI 9-1-1 Subcommittee should establish technical and operational standards that are required for PSAPs to join the NG9-1-1 system. The State can work with the NG9-1-1 system vendor to establish what PSAPs need to do to connect to the network and maintain the health of the system.

National public safety agencies and the federal government have encouraged state-level coordination for NG9-1-1.[2] Statewide coordination of NG9-1-1 has been a prerequisite for federal grant funding in the past and is likely to remain a requirement for any present or future federal NG9-1-1 funding.

Coordination of Wisconsin's NG9-1-1 implementation will require stakeholder education, buy-in, and involvement during the duration of the migration to NG9-1-1. It is crucial that these various stakeholders and future NG9-1-1 system users be involved in NG9-1-1 planning to assure that the system is planned with consideration given to the unique needs of the system users.

2.2.2.2 NG9-1-1 Governance Considerations

A successful statewide NG9-1-1 transition requires that all policies, procedures, and operational methods are consistent and support the NG9-1-1 system. An effective NG9-1-1 governance model maintains a consistent approach that assures that all technical and operational capabilities can be managed in a cost efficient and technically effective manner.

A successful NG9-1-1 governance model establishes the means of achieving the coordination of a new and complex NG9-1-1 system statewide. System requirements and operational capabilities need to be consistent and manageable. The complexity of a NG9-1-1 system necessitates formal coordination of system users and vendors regarding requirements, interconnections, and other considerations to effectively operate and manage it. NG9-1-1 governance models formally establish roles and responsibilities related to the system and a process

[2] Legal and Regulatory Framework for Next Generation 911 Services, Report to Congress and Recommendations, February 22, 2013, Federal Communications Commission, Sections 2 and 4.1.

for performing shared responsibilities.

NG9-1-1 systems are designed with interconnection in mind. An eventual goal of the Wisconsin statewide NG9-1-1 system is to connect to surrounding states' NG9-1-1 systems to allow call transfer, data sharing, and other applications across networks. These are examples of circumstances that most legacy 9-1-1 governance structures are not prepared to address. Workgroups or subcommittees comprised of subject matter experts and system users in Wisconsin will need to be organized, facilitated, and incorporated to address these emerging circumstances.

2.2.2.3 Roles and Responsibilities for ESInet Governance

This section discusses the responsibilities related to the implementation and operation of NG9-1-1 for the state and PSAPs. Each governance participant has responsibilities that may overlap over the course of system implementation and operation. This requires clear, consistent communication, and coordination by all participants.

2.2.2.3.1 Wisconsin State 9-1-1 Office

The OEC, in conjunction with the WI 9-1-1 Subcommittee, will provide strategic direction, leadership, oversight, and monitoring for the transition to and operation of NG9-1-1 in the State. The OEC will work with the WI 9-1-1 Subcommittee and PSAPs to assure the consistent and efficient operation of the NG9-1-1 system statewide.

2.2.2.3.2 PSAPs

The PSAPs will assist the governance structure in the implementation process as a stakeholder and customer of the eventual NG9-1-1 system. The PSAPs are the primary stakeholders and should have input regarding network configurations and NGCS. PSAPs will be responsible for ensuring that their requirements are accurately disclosed to the vendor so that the system is operationally focused on their needs and meets their requirements. This process has already begun with the recent PSAP Assessment Survey detailed in this document. The survey results are driving the requirements in the RFP to procure the system. It is important that the PSAPs remain involved in network governance by communicating operational feedback and needs up to the WI 9-1-1 Subcommittee. A process should be in place to foster this communication.

The State 9-1-1 Office will coordinate with PSAPs to deploy the ESInet infrastructure to support existing services and future services. PSAPs will utilize state provided policies and standards to utilize the ESInet and NGCS to benefit their jurisdictions and will also work with the State 9-1-1 Office to manage risks. Regular communication between the PSAPs and the State 9-1-1 Office about the network function, feature, and operation may help to identify problems before they reach critical mass. PSAPs will be able to alert the State 9-1-1 Office of small problems as they pop up that can aid in timely diagnosis of network issues and will help to maintain the health of the network.

The PSAPs will work with the State and the vendor to migrate functions to the NG9-1-1 system. Boundary identification and maintenance from a call routing perspective will be a key element for the State 9-1-1 Office and the PSAPs to coordinate.

PSAPs will work in conjunction with the State and the vendor to manage changes to their PSAP operation as it relates to the ESInet. A change management process becomes an essential management function that each PSAP uses to arrange the network to suit their goals.

Local operational responsibilities include:

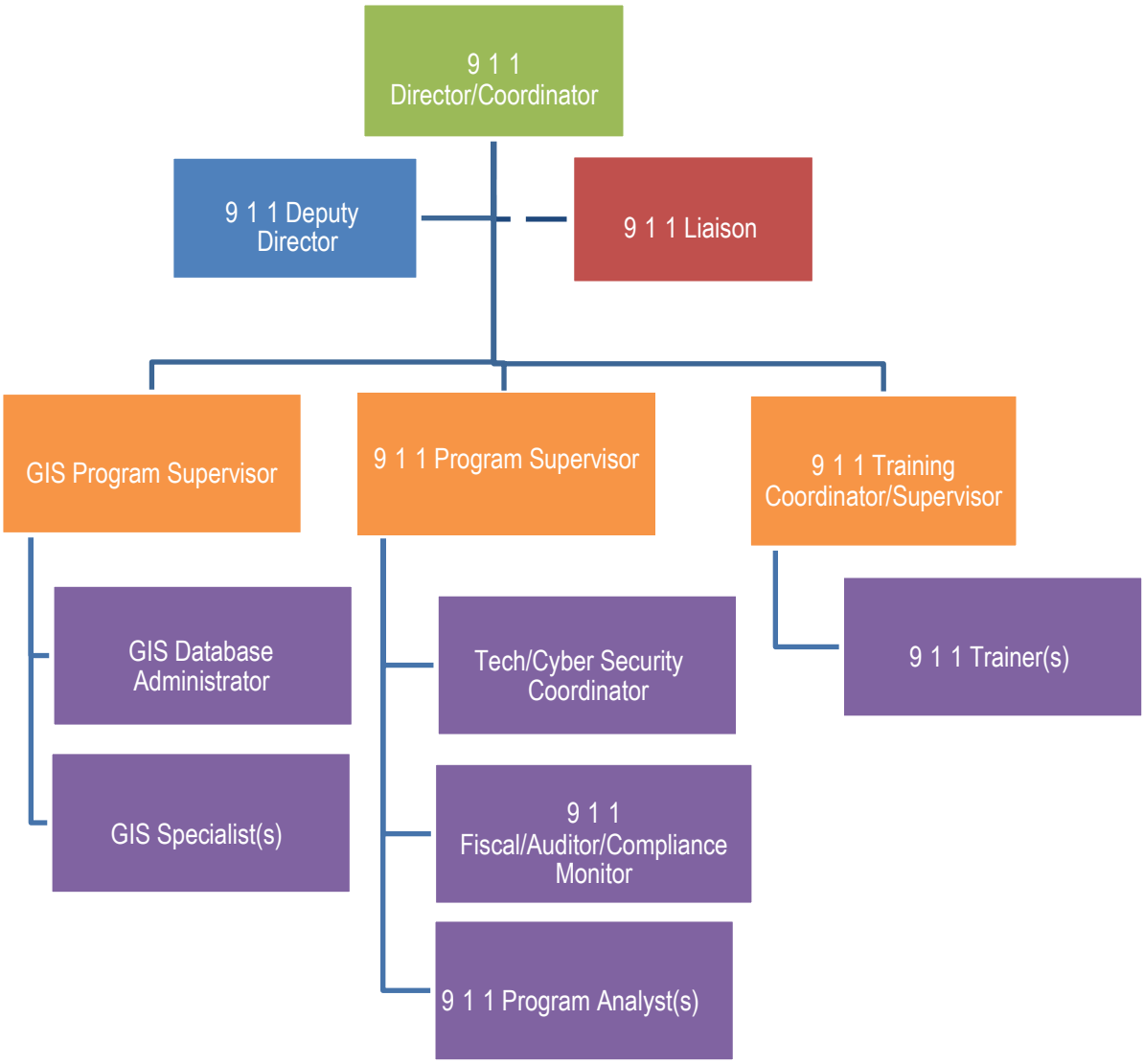
- Communication with State on operational feedback and needs, as well as technical issues
- Providing network performance feedback on a regular timely basis
- Trouble reporting to the vendor and the State 9-1-1 Office in a timely fashion
- Cooperation to resolve problems

2.2.3 Proposed Governance Structure

In May 2017, the NextGen 9-1-1 Workgroup (hereinafter "Workgroup") created the Wisconsin Statewide NG9-1-1 Plan (hereinafter "Plan"). As part of this planning effort, the Workgroup proposed an organizational chart of their vision for the State 9-1-1 Office based on existing state models and existing administrative structures seen in Wisconsin agencies that could be easily incorporated into a current state agency.

The proposed organizational chart could also be used as a basis for a NG9-1-1 governance structure in Wisconsin. Although this governance structure was drafted several years ago, it will be useful as a basis for planning the NG9-1-1 network governance structure. A state-level governance structure should encompass leadership, organization, and stakeholder representation; however, there needs to be strong leadership and organization at the State 9-1-1 Office in order to accomplish this goal and incorporate all these components.

On the following page is the proposed organizational chart as detailed in the Plan, dated May 2017. Some revisions have been made to the proposed organizational chart to reflect changes that have occurred since the Plan was published. Also included is an explanation of the duties that the Plan recommends fall within the scope of the State 9-1-1 Office and a brief description of each position. It should be noted that some of the duties specified are currently incorporated into existing positions within the OEC.



State 9-1-1 Office Duties: The following duties typically fall within the scope of authority of a State 9-1-1 Office:

- Designates Statewide 9-1-1 Coordinator
- Provides public education on 9-1-1/NG9-1-1
- Collects and shares information related to 9-1-1
- Develops/maintains State NG9-1-1 Plan
- Provides Annual Report to Legislature
- Conducts audits/requires documentation from PSAPs receiving funds
- Provides technical assistance to local systems
- Assists locals with designing and implementing new systems
- Provides training
- Maintains state GIS database

- Ensures cyber security standards (CJIS, etc.) are met

9-1-1 Director/Coordinator: Designated by OEC

- Act as state point of contact for 9-1-1 information in Wisconsin
- Manage and coordinate duties that fall within the scope of authority of a State 9-1-1 Office
- Provide support and guidance in creation and implementation of the State 9-1-1 Plan
- Review local and county 9-1-1 plans to ensure interoperability and standards compliance
- Implement decisions based on OEC authorization and recommendations from the IC/WI 9-1-1 Subcommittee

9-1-1 Deputy Director:

- Provide direct supervision over various programs within the State 9-1-1 Office
- Convey and implement decisions of the 9-1-1 Director/Coordinator

9-1-1 Liaison:

- Serve as point of contact between PSAPs, the State 9-1-1 Office, and the Legislature
- This position can also be incorporated into another proposed position such as the 9-1-1 Director/Coordinator or the 9-1-1 Deputy Director

GIS Program Supervisor:

- Provides direct supervision over GIS program
- Implements GIS policies based on coordination with the 9-1-1 Director/WI 9-1-1 Subcommittee and OEC authorization

GIS Database Administrator

- Responsible for creating and maintaining a GIS database for 9-1-1 services
- This position can also be incorporated into the GIS Program supervisor position

GIS Specialist(s):

- Provide support to the GIS Database Administrator and/or GIS Program Supervisor

9-1-1 Program Supervisor:

- Provide direct supervision over the 9-1-1 program including; technical/cyber security standards, fiscal, audit, compliance, biennial budgeting, grants management, etc.
- Implement program policies and fiscal decisions based on OEC authorization and recommendations from the IC/WI 9-1-1 Subcommittee

Tech/Cyber Security Coordinator:

- Provides coordination of technical specifications and cyber security standards that will be essential to achieve interoperability and protect against cyber-attacks on PSAPs

9-1-1 Fiscal/Audit/Compliance Monitor:

- This position can be split into several positions depending on workload and funding
- Provide fiscal and grants management support to the OEC
- Perform audits and compliance monitoring for PSAPs

9-1-1 Program Analyst(s):

- Provide support for 9-1-1 program including fiscal/grants planning, drafting annual reports, and maintaining program records, etc.

9-1-1 Training Coordinator/Supervisor:

- Provides direct supervision over 9-1-1 training program
- Implements training policies and standards

9-1-1 Trainer(s):

- Provide in-the-field training to local and county PSAPs based on training and standards policies set by the 9-1-1 Board

9-1-1 Admin Support:

- This position provides staff support (logistics, meeting notices, minutes, etc.) to the IC/ WI 9-1-1 Subcommittee, 9-1-1 Director, and staff
- This position can fall under the direct supervision of the OEC
- This position could also be incorporated into another position such as 9-1-1 Program Analyst

Other Potential Duties (OEC):

- Authority over funding – OEC should have authority over baseline administrative costs as well as system costs, grants, etc. with the support of the 9-1-1 Director and staff
- Preparation of biennial budget
- Procurement of NG9-1-1 system and equipment
- Authority to initiate legal action
- Federal Grant Management/Ability to award grants to locals
- Approve/Disapprove local NG 9-1-1 System Plans based on compliance

While the State 9-1-1 Office plans to manage the deployment, operation, and procurement of the NG9-1-1 system, a venue should exist for coordination of stakeholders at the PSAP level to address communication between the participating PSAPs and the State.

The next step towards forming a governance structure in Wisconsin is standing up a Network Governance PSAP Committee (PSAP Committee) with the input of the WI 9-1-1 Subcommittee. The PSAP Committee will need to be formed when the ESInet implementation is underway but before it is complete. A representative at the State 9-1-1 Office should lead and facilitate the PSAP Committee with the support and participation of members of the WI 9-1-1 Subcommittee. The PSAP Committee should be made up of PSAP Directors and County Coordinators throughout the state as well as two to three WI 9-1-1 Subcommittee members.

Additionally, the WI 9-1-1 Subcommittee will need to make the following decisions related to establishing the PSAP Committee and how they will contribute to system governance:

- **Participants**
  - Which system participants should have established roles and responsibilities?
  - Who will carry out system objectives?
- **Process**
  - Macro-level – What should the overall governance process look like?
  - Who will make what decisions?
  - How will participants needs be represented in the process?
- **Tasks**
  - How will activities be tasked and tracked?
- **Planning**
  - How will NG9-1-1 planning be conducted?
- **Measurement and Reporting**
  - How will success be measured?

The WI 9-1-1 Subcommittee can move forward with NG9-1-1 network governance planning by meeting to discuss the above questions and brainstorm how to move forward in a way that is best for Wisconsin.

2.3 NG9-1-1 Costs and Funding

2.3.1 Funding Considerations

When “basic” 9-1-1 service systems were implemented, the Incumbent Local Exchange Carrier (ILEC) was also the 9-1-1 service provider and charged rates that were set by tariff by the Public Service Commission (PSC). The addition of “sophisticated 9-1-1 services” did not change the rate structure in the state. This method of funding allows the 9-1-1 provider to seek reimbursement for services provided; local government remains responsible for all other costs associated with the operation of the PSAP.

Wis. Stat. § 256.35(3)(b) authorizes a county by ordinance to levy a charge on all service users in the county to finance the costs related to the operation of a basic or sophisticated 9-1-1 service system in that county under certain circumstances and restrictions. These charges are limited by county based upon the number of access lines or its equivalent and population.

The consumers' choice to abandon traditional landline telephone service for new technology (wireless) has resulted in less 9-1-1 revenue being generated through this practice.

In 2009, the state legislature enacted the Police and Fire Protection Fee. The fee is charged to consumers for each voice communications connection with an assigned telephone number. In this instance, voice communications connections include landline, VoIP, and wireless. The fee is set at $ 0.75 on landline, VoIP and wireless devices, and $ 0.38 per transaction on prepaid wireless. Fees collected by the communication providers and retailers are remitted to the Wisconsin Department of Revenue.

Annually, approximately $54 million in revenue is received through the Police and Fire Protection Fee. This revenue source is more than sufficient to pay for the projected costs of a Statewide NG9-1-1 system. However, it should be noted that the Police and Fire Protection Fee is not considered a 9-1-1 surcharge and only 12% of the revenues collected through this source is allocated to 9-1-1 annually. Most states have imposed a communication service fee, similar to the Police and Fire Protection Fee, to pay for some of the costs associated with a statewide 9-1-1 program. Other states have enacted other taxes or fees in addition to their tax system for statewide services.

During the Assessment survey, PSAP expenditure data was obtained. Information provided by local authorities varied based upon contractual obligations with their system service provider, vendors and/or their relationship to other municipal agencies in that jurisdiction. 73 PSAPS provided some level of PSAP cost information in the Survey. Normalization of data was necessary to represent the expenditure appropriately within a category.

The transition period to NG9-1-1 requires the PSAP to operate both in the legacy and NG9-1-1 environments, which may create duplicate expenditures for a short amount of time. Consideration of sustainable funding during and after the transition is vital to the implementation of NG9-1-1 components moving forward. The 9-1-1 industry is capital intensive, which means that local government must be able to fund or pay for their current (legacy 9-1-1) and new (NG9-1-1) equipment and infrastructure during the transition.

The NG9-1-1 funding method should encompass the principle of access, which means every device, technology, application, or service capable of accessing the legacy/analog 9-1-1 system and the NG9-1-1 system should share in the total cost of 9-1-1 service. The method should also be neutral in terms of technology, service, vendor/provider, and competition, so that it does not give competitive advantages to any particular telecommunications, broadband, or data provider at the expense of other providers. For example, the majority of states have enacted legislation that places a fee on communications technologies (wireline, VoIP, wireless, and prepaid wireless) to assist in paying for 9-1-1 services. States vary on how the fee is collected, distributed, and spent within statutory authority of 9-1-1 services. Historically, fees on landline communications services were enacted at the local level, either in a "bill and remit" or "bill and keep" environment. For most states, the inclusion of the wireless fee was "bill and keep" at the state level, with some states distributing the funds back to local government through a distribution formula or grant process.

Some states who have established state programs and have the fee collection at the state level use a percentage of those funds to pay for the operation and maintenance of the statewide NG9-1-1 system. For example, Indiana changed their statute in 2012 to provide for all 9-1-1 fees to be collected by the State and then used for 9-1-1 services (state and local) only. Indiana's Statewide 9-1-1 Board retains approximately 14 percent of the revenue for administrative responsibilities and to pay for the NG9-1-1 systems. The balance of the funds is distributed to local government to support the operation of their PSAP.

The funding method should provide parity with respect to the type of wireless service used by the consumer. That is, if a 9-1-1 fee is imposed on wireless service, the wireless pre-paid fee should be set at a percentage of the retail point of sale value that is equivalent to the monthly wireless 9-1-1 fee for wireless subscribers. Setting the wireless pre-paid fee as a flat fee does not account for inflation or the number of minutes purchased. Additionally, the funding method should be easy to understand and administer as well as periodically adjusted for inflation.

States must take care in how 9-1-1 fees are distributed so as not to divert the funds to other purposes outside of 9-1-1 services. As part of the New and Emerging Technologies 911 Act of 2008 (NET 911 Act), the FCC is required to submit an annual report to Congress on the collection and distribution of 9-1-1 fees and charges.[3] States that report using funds generated through 9-1-1 fees for any purpose other than the support of 9-1-1 are identified by the FCC in their annual report to Congress and may be at risk of losing federal grant funding.

2.3.2 Current PSAP Cost Analysis

The PSAP Survey asked respondents to provide cost information related to the operation of the PSAP. The information provided by the PSAPs identified four major cost areas related to 9-1-1 operations. They are:

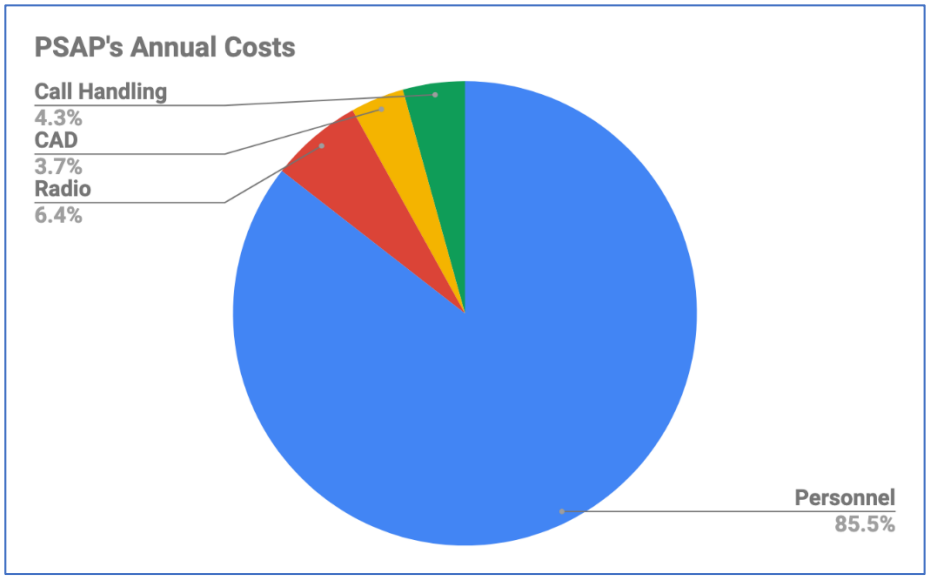
- Personnel costs (salary and benefits)
- Dispatch radio system costs (radio consoles, voice logging recorders, headsets/handsets)
- Computer Aided Dispatch (CAD) system costs (hardware, software, maintenance)
- 9-1-1 Call Handling Equipment (CHE) costs (hardware, software, maintenance)

As expected, the largest cost factor for any PSAP in Wisconsin is personnel. This is consistent with predominant costs for other PSAPs and other states across the country. Few if any statewide funding programs consider or account for personnel costs related to 9-1-1. This is due largely to the fact that 9-1-1 is a service provided by local government. Typically, personnel costs are the responsibility of the jurisdiction responsible for providing the 9-1-1 service.

After personnel costs, equipment and system costs related to processing and dispatching of 9-1-1 calls are the next areas that demand budgets and local resources to support. The table and chart below detail the cost information provided by the 73 PSAPs that responded to the survey question.

[3] FCC Annual 9-1-1 Fee Reports to Congress, https://www.fcc.gov/general/911-fee-reports

Category	Amount
Personnel	$111,029,987.24
Radio	$7,360,789.59
CAD	$4,338,076.38
Call Handling	$4,916,051.69
Grand Total	$127,644,904.90



A transition to NG9-1-1 will not directly affect costs related to personnel, radio systems or CAD systems, but it will have an impact on the costs for Call Handling Equipment (CHE). Additional costs related to the transition to and operation of a NG9-1-1 system are explored in the following section.

2.3.3 NG9-1-1 Costs

Costs in a NG9-1-1 operating environment are similar to and, in certain instances, may replace the current costs PSAPs pay related to 9-1-1 call delivery and processing. The costs for today's 9-1-1 system is based largely on regulated and tariffed services specific to wireline telephones as defined and provided by the legacy telephone companies. These costs, and the legacy-regulated mechanisms in place to pay for them, are removed by the transition to NG9-1-1.

Conversely, NG9-1-1 costs are established using standards-based technologies that are not tariffed or regulated. The implementation of Wisconsin's NG9-1-1 system will change the traditional "bill and keep" methodology to a system where the state program will pay for the ESInet. This implies a transition away from

old costs to new costs for PSAPs and identifies a potential time when both costs are present and incurred while the NG91-1 transition is underway. The local providers will continue the "bill and keep" practice in some capacity until the entire state is transitioned onto the new system provided Wisconsin's statutes are amended to require 9-1-1 centers to utilize the NG9-1-1 system for 9-1-1 call delivery.

There are several strategies for mitigating the occurrence of overlapping PSAP costs while the transition to NG9-1-1 takes place. A successful strategy used in other states is to negotiate terms establishing that payment for any NG9-1-1 related services will only occur upon the successful cutover and testing of NG9-1-1 service to the PSAP. This approach creates a milestone event that can be used to determine when old costs end, and new costs begin.

As the transition to NG9-1-1 begins, new and different cost elements will come into play. The factors that will impact, drive and influence costs for NG9-1-1 include:

- ESInet and Network Costs
- NG9-1-1 Core Services/i3 Standards Costs
- NG9-1-1 Transition Costs
- Geographic Information System Costs
- Training/Support Costs

2.3.3.1 ESInet and Network Costs

The ESInet and network costs fall into three general areas:

1. **Ingress** – the network needed to get 9-1-1 calls from the Originating Service Providers (OSPs) to the Next Generation Core Services (NGCS) for processing and routing to a PSAP (includes network elements such as the Legacy Network Gateway (LNG), where necessary).
2. **Core** – the network needed to process 9-1-1 calls between geo-diverse Next Generation Core Service nodes typical of most NG9-1-1 systems (includes network elements such as Border Control Functions (BCFs), Location Information Server (LIS), Emergency Services Routing Proxy (ESRP), Emergency Call Routing Function (ECRF), and Location Validation Function (LVF)).
3. **Egress** – the network needed to deliver 9-1-1 calls from the core to the PSAPs for processing and dispatch (includes network elements such as the Legacy PSAP Gateway (LPG)).

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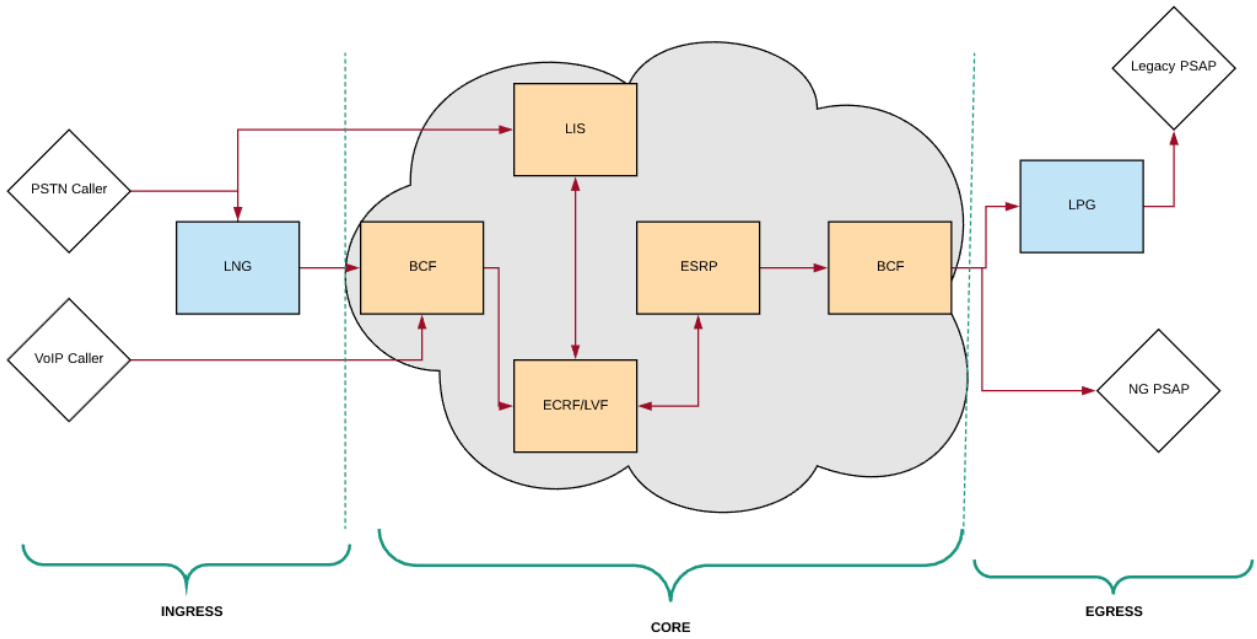


Basic NG9-1-1 System Diagram

Egress ESInet and network costs will replace the 9-1-1 trunk costs incurred by PSAPs today. All ESInet and network costs are generally driven by the number of connections and the bandwidth required for those connections. For example, if there are 108 PSAPs and each PSAP requires a 10 mbps connection to the ESInet for 9-1-1 call processing then a service provider can take that information, design the egress ESInet to the PSAPs, and establish a cost for doing so.

Additionally, ESInets require hardware and specialized equipment in order to operate as expected. The type of hardware used, and the level of redundancy needed for 99.999% availability will drive the cost for the ESInet as well. The ESInet hardware components that will be required include:

- **Border control functions and Session Border Controllers** (**SBC**)– used for 9-1-1 call control and security in the ingress and egress sides of the ESInet
- **Core Routers** – to route traffic between the NGCS, typically high capacity and expensive
- **NGCS Application Stack x2** – used to process 9-1-1 calls and route to the PSAPs, typically two or more instances in geo-diverse locations
- **Edge Routers** – to route traffic between the NGCS and the PSAPs, typically a minimum of two per PSAP for proper redundant connectivity to the NGCS

These elements will be new costs and will be incurred in addition to the existing expenses at the state and local level for things like radio, CAD, or CHE.

The ESInet network connectivity components include some elements that require redundancy for network

reliability, effectively doubling the costs. For example, each of these bullets represents a duplicated cost:

- Redundant connections NGCS to OSP
- Redundant connections NGCS to NGCS
- Redundant connections NGCS to PSAP
- Redundant connections NGCS to Interstate-NGCS

The ESInet portion will directly affect the costs of network connectivity at the PSAPs. Depending upon the transition and migration strategy employed for the ESInet, these costs may be phased in. In addition, the ESInet costs will offset other charges that are currently being paid such as analog 9-1-1 trunks or ALI. Once a PSAP is fully transitioned to the ESInet and the contract between a PSAP and a system service provider is terminated, a service provider may no longer charge service users in that jurisdiction to recover costs under Wis. Stat. § 256.35(3)(b).

2.3.3.2 NG9-1-1 Core Services/i3 Standards Costs

The NGCS functional element stacks are implemented to process and route NG9-1-1 calls across the ESInet and the state. These functional elements and service components are necessary for the transition into a fully functional NG9-1-1 network and will bring new service costs to the program as a result.

NG9-1-1 functional elements and services will drive costs for DMA/OEC in the transition to and operation of the NG9-1-1 systems. The NG9-1-1 functional elements include:

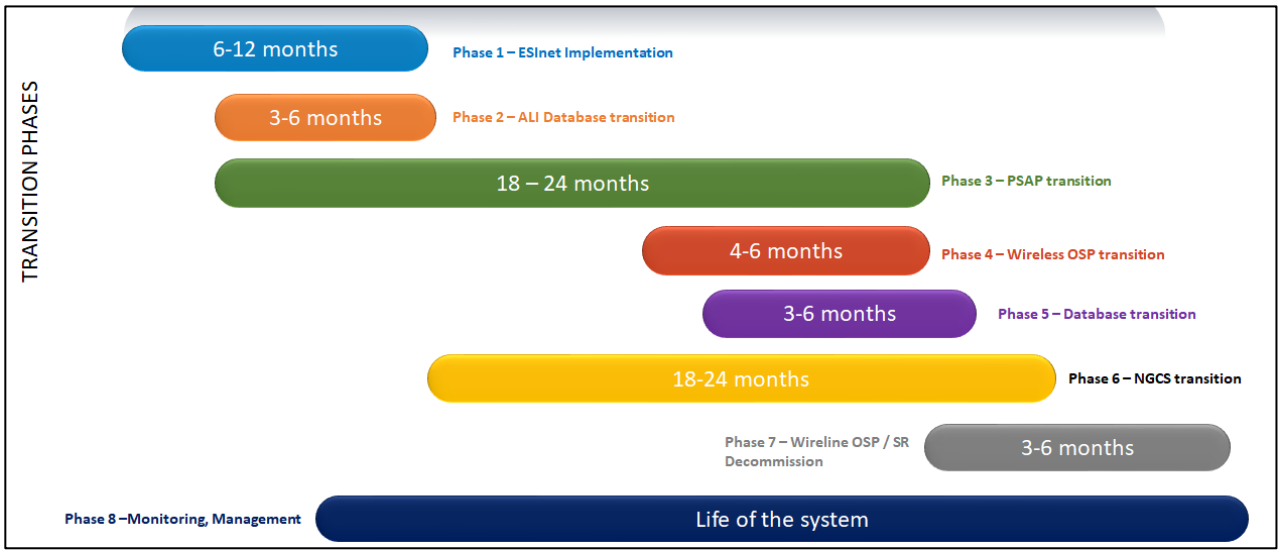
- Emergency Services Routing Proxy (ESRP) – would be replicated across NGCS cores and used by PSAP CHE
- Location Information Server (LIS) / ALI and Database service – would be centralized and aggregated in the core and used by PSAP CHE
- Emergency Call Routing Function/Location Validation Function (ECRF/LVF) – would be replicated across NGCS cores and used by PSAP CHE
- Legacy Selective Router Gateway (LSRG) – needed for transition from legacy to NG9-1-1, cost will decrease over time
- Legacy Network Gateway (LNG) – needed on the ingress side for OSP transition, cost will decrease over time. LNG's will be required until all OSPs have transitioned to IP connectivity to the ESInet
- Legacy PSAP Gateway (LPG) – needed during the transition from legacy 9-1-1 to NG9-1-1, cost will decrease over time. LPG's will be required until all PSAPs have transitioned to "NG9-1-1 capable" CHE

2.3.3.3 NG9-1-1 Transition Costs

A transition from the legacy 9-1-1 system to a NG9-1-1 system will be necessary for all PSAPs and citizens to benefit from the increased capabilities NG9-1-1 will bring to Wisconsin. While there are no standardized approaches or methodologies for going through the transition, there are identifiable phases or milestones that are necessary to complete in order to move from one environment to the other.

Each phase of the transition to NG9-1-1 has the potential to impact costs carried by the current system. The

NG9-1-1 system deployment in Wisconsin will essentially follow this progression and timeline until full NG9-1-1 deployment is established. The common timeline for completing this transition is 18 – 24 months from the time a NG9-1-1 services contract is signed. The figure below displays the typical NG9-1-1 transition phases over time.



*Example NG9-1-1 Transition Roadmap

As the NG9-1-1 system deployment progresses through these transition phases, economies of scale and consolidation of fragmented technical services like ALI should allow for cost savings in subsequent phases. Not all the phases are sequential, and some can begin in parallel. Some phases may be dependent upon the completion of a prior phase. For example, the completion of the Phase 1 – ESInet, is needed before Phases 2-8 can be completed.

PSAP costs associated with the transition to NG9-1-1 are controlled by the length of time both the legacy 9-1-1 and NG9-1-1 systems are required to operate together. As long as PSAPs are getting 9-1-1 calls routed to them from the legacy 9-1-1 system, they will be liable for those legacy costs. In other words, until all the PSAPs are cutover to and receiving all 9-1-1 calls from the NG9-1-1 system/ESInet, the legacy 9-1-1 system is still needed and legacy PSAP costs will be incurred in order to process 9-1-1 calls in Wisconsin. When PSAPs are no longer using the legacy 9-1-1 system to process 9-1-1 calls, those legacy PSAP costs should go away. For most PSAPs, this would occur at the end of Phase 3 above.

Phases 6 and 7 above are primarily on the ingress side of the NG9-1-1 system and include transition costs. Phases 6 and 7 also tend to be the longest transition steps to complete in a NG9-1-1 system deployment. Phase 6 is the transition of Originating Service Providers (OSP) away from sending their 9-1-1 calls to the legacy 9-1-1 Selective Routers. It also addresses the ESInet and NG9-1-1 system which then routes them to the ESInet

connected PSAP cutover in Phase 3. Phase 7 is where Selective Routers are no longer routing 9-1-1 calls, they and their associated costs can be removed.

Both the transition and NG9-1-1 costs created by these transition changes in Phases 6 and 7 are traditionally not the responsibility of the PSAPs or the state program directly. Some legacy costs associated with legacy 9-1-1 service elements, like ALI, will still apply and would be the responsibility of the NG9-1-1 service provider.

2.3.3.4 NG9-1-1 Geographic Information System Costs

The importance of Geographic Information Systems (GIS) in the NG9-1-1 operating environment will require an increase in costs associated with developing, maintaining, and using GIS data at both the state and local levels. The GIS/Geo-based routing costs are influenced by the expected bandwidth required and Emergency Call Routing Function (ECRF) / Location Validation Function (LVF) requirements for all 9-1-1 call routing in the state. Costs for Wisconsin would include contracting with a third party to operate the ECRF and remediate the GIS data to ensure that the data is correct and can route 9-1-1 calls.

Additionally, GIS costs include a level of redundancy within the call routing framework to provide reliability and access to the NGCS functional elements using and accessing the GIS data. Typically, a vendor is required to supply reconciliation and synchronization services to maximize the readiness of data and GIS files for operation. Vendors have developed tools and systems to streamline the ongoing data update and QA/QC specifically for the NG9-1-1 market. The operational components (Spatial Interface) and functions to manipulate the database once it is operational are much better served through a vendor and include:

- Data Normalization Services
- Back Office
- Hardware

Costs of completing GIS data readiness can be reduced marginally through the efforts of the State GIS or other operational group that can assist in meeting the NENA NG9-1-1 GIS database requirements. Such costs are primarily in the equipment required to store and allow access to the location information. For instance, the State may create and own the GIS repository for the State but allow access to the vendor described above to embed their toolkit for data processes. This reduces the need for the GIS database to be shipped to the vendor and stored at their facility.

2.3.3.5 NG9-1-1 Training/Support Costs

NG9-1-1 by itself will not drive training costs at the PSAPs. There may be new ways of processing new types of 9-1-1 calls, but generally speaking, any training associated with that will be dependent on the system or application the PSAP chooses and purchases. CAD is a good example of a system where training related to NG9-1-1 capabilities may be needed but would be specific to the CAD application used. Text-to-9-1-1 and enhanced location services are additional examples of NG9-1-1 features that will require additional training. As technology changes and advances, new applications will be added to NG9-1-1 networks and will require

separate training as well.

An area where NG9-1-1 may increase costs for PSAPs is in technical or specialized support related to NG9-1-1 technologies and functions. Any costs would largely depend on the PSAP in question as some PSAPs have extensive internal support staff while others rely on external parties for any technical support. NG9-1-1 brings an increased reliance on technologies like GIS, networking, and cybersecurity. GIS and cybersecurity are areas that PSAPs may not be prepared to support in a NG9-1-1 environment or have access to full-time support staff necessary to operate and maintain NG9-1-1 systems related to GIS and cybersecurity.

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2.4 Findings and Conclusions

The following list summarizes the findings and conclusions for NG9-1-1 governance and funding:

- The current legislation relative to 9-1-1 in Wisconsin needs modification, making the language more inclusive of NG9-1-1 and to better enable the transition to NG9-1-1 in Wisconsin.
- The current governance structure in Wisconsin is appropriate for the beginning stages of transitioning to NG9-1-1, but there may need to be additional forms of governance, authorities, and policies developed as the PSAPs transition to and operationalize NG9-1-1.
- Funding for the operation of PSAPs in Wisconsin occurs at the local level and is supported by local general funds. Current revenues collected to fund legacy 9-1-1 (i.e. bill and keep) will not support the costs associated with operating a NG9-1-1 system serving all the PSAPs across the state.
- Possible funding sources available to fund the transition to and operation of a NG9-1-1 system include statutory allocation to DMA/OEC, federal NG9-1-1 matching grants (if available), allocations from the Police and Fire Protection fund or a return to a 9-1-1 surcharge, and allocations from local general funds.
- None of the potential funding methods on their own are capable of paying for and supporting the ongoing operation of a NG9-1-1 system serving all the PSAPs in Wisconsin. This could result in future funding shortfalls that could jeopardize the NG9-1-1 service to the PSAPs.
- The State should identify a sustainable funding model for the implementation and operation of the Wisconsin statewide ESInet.
- Funding 9-1-1 by allocation is not consistent with other states' approaches to supporting the transition to and operation of a NG9-1-1 system. The predominant NG9-1-1 funding model relies on a dedicated fee on user devices or types of devices that use the 9-1-1 system. According to the FCC's 10th Annual 9-1-1 Fee Report to Congress, 35 states, the District of Columbia, and Puerto Rico reported using some portion of 9-1-1 fees collected to fund NG9-1-1 projects in 2017.

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3. Current 9-1-1 Infrastructure in Wisconsin

One of the main goals of the Assessment is to establish a baseline of the current 9-1-1 infrastructure in Wisconsin. Using a combination of data collected by the PSAP Assessment Survey tool, existing program documentation, and site visits with various PSAPs, this section of the Report provides the detailed analysis of our findings. This section examines the following areas:

1. Wisconsin 9-1-1 System Scope and Size
2. PSAPs Identified by this Assessment
3. Current 9-1-1 Call Delivery Network
4. Current 9-1-1 Call Handling Equipment

3.1 Wisconsin 9-1-1 System Scope and Size

A major component of the Assessment is determining the size, scope, and scale of 9-1-1 and PSAP operations across Wisconsin. For the purposes of the Assessment, an examination of the current system and its influence or impact on NG9-1-1 using the following metrics is relevant:

- Number of PSAPs
- Number of PSAP call taking positions
- Number of 9-1-1 trunks
- Number of staff assisting in PSAP operations
- Number of first responder agencies served by PSAPs
- Number of annual 9-1-1 Calls

Each of these will be analyzed in the following sections using the PSAP Assessment Survey data and experiences from other NG9-1-1 implementations. Here are some quick facts related to the scope and size of 9-1-1 in Wisconsin as determined by the responses to the PSAP Assessment Survey.

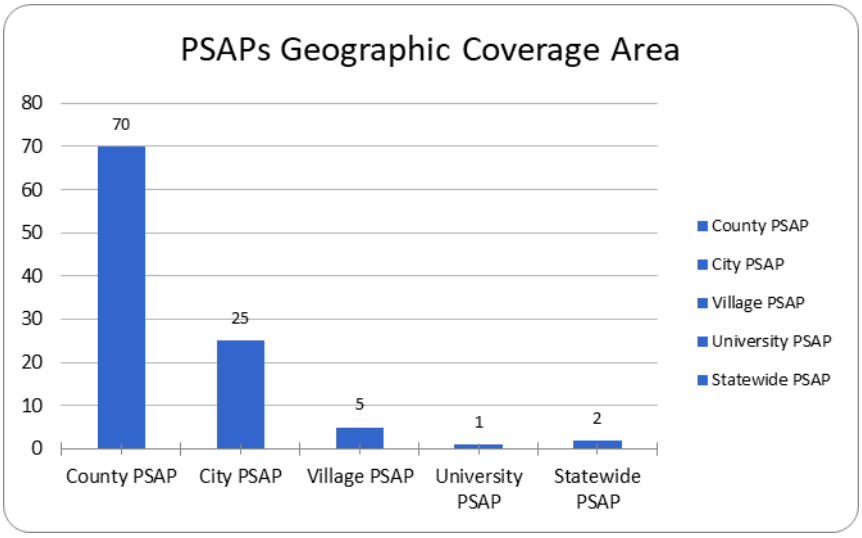
9 1 1 in Wisconsin Quick Facts	
Wisconsin PSAPs (Responded/Estimated actual)	108/122
9-1-1 Call Answering Positions	641
9-1-1 Trunks	653
9-1-1 Staff	2,115
First Responder Agencies Served (Fire, Police, EMS, includes duplication)	2,288
9-1-1 Calls (annual approximate as reported)	3,000,000
Total Calls handled by PSAPs (annual approximate as reported)	9,000,000

3.1.1 Number of Wisconsin PSAPs

The PSAP Assessment Survey asked the PSAPs to provide information on what geographic area they covered from a 9-1-1 call taking perspective. This is important to know for many reasons, not the least of which is these geographic distinctions help determine who the OEC and any future NG9-1-1 system service provider would need to coordinate with and where 9-1-1 service and funding responsibility exists for a PSAP. For the transition to NG9-1-1, this information would need to be reflected in any NG9-1-1 services RFP and would be needed by any NG9-1-1 system service provider contracted in WI in order to properly size and price NG9-1-1 services.

The following chart shows the categorization of PSAPs into their unit of government or jurisdictional boundary. This data collected from the PSAPs reflects a typical statewide distribution of PSAPs in a County/City/Municipal hierarchy along with a mix of higher education and state agencies that have some specialized responsibility for answering or dispatching 9-1-1 calls.

It is a fairly common practice across the country to vest responsibility for 9-1-1 at the county level. Wisconsin is consistent with that model in that each of Wisconsin's 72 counties have a PSAP that directly answers 9-1-1 calls. Not all counties dispatch those calls, nor do all county PSAPs answer all the 9-1-1 calls originating within their county, as evidenced by the existence of some city/village PSAPs taking wireline 9-1-1 calls directly and getting wireless 9-1-1 calls transferred in from the county PSAP.

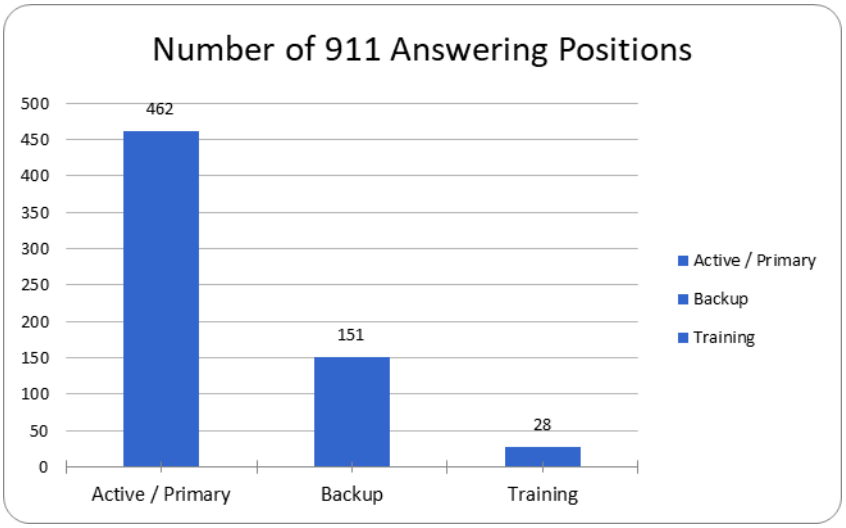


Using the information provided by the PSAPs and cross validating it with the sources cited in Section 1 of the Report, there are 108 PSAPs that responded to the Survey and an estimated 122 PSAPs operating in the state of Wisconsin as of April 2019.

3.1.2 Number of 9-1-1 Call Answering Positions

The PSAPs answer 9-1-1 calls using call answering systems commonly referred to as Call Handling Equipment (CHE) or Customer Premise Equipment (CPE). Generally speaking, all PSAPs in Wisconsin have the authority and autonomy to purchase and use any CHE/CPE system to answer and process 9-1-1 calls from the public to fulfill their statutory obligations related to 9-1-1.

The PSAP Assessment Survey also sought to identify how many 9-1-1 call answering positions the PSAPs have in their 9-1-1 centers. Ninety-eight PSAPs submitted specific information related to call answering positions through the Survey. This is important information to know as costs can be attributed to this information as well as NG9-1-1 system sizing, capacities, and capabilities for RFPs, etc. Preliminary determinations can be made on the NG9-1-1 readiness of the current CPE based on the information provided by the PSAPs. The results are identified below.



How many 9 1 1 answering positions does your PSAP have?		
Answers	**Total Number of Positions**	**Average Number of Positions**
Active / Primary	462	4.76
Backup	151	1.56
Training	28	0.29
Total	641	-
	Responded	98

The distribution of 9-1-1 call answering positions across the state is consistent with other 9-1-1 environments across the country in that the number of positions at a PSAP is generally related to the population served by that PSAP. For example, a rural county with a population under 10,000 is likely to have a two position PSAP and

lower 9-1-1 call volumes. They will usually have one telecommunicator answering 9-1-1 calls at any given time.

3.1.3 Number of 9-1-1 Trunks

Another way to determine the scope, size, and scale of a 9-1-1 system is to look at the current number of 9-1-1 trunks used to connect a 9-1-1 caller to a PSAP. A 9-1-1 trunk is typically defined as a communication path between central office switches, or between the 9-1-1 Control Office and the PSAP.

Generally, all the primary PSAPs in Wisconsin have 9-1-1 calls delivered to them over a 9-1-1 trunk. The PSAP Assessment Survey asked participants to identify how many 9-1-1 trunks they have. This is important information to know because current 9-1-1 costs are associated with these trunks; which gives an idea of the capacity of the current system or maximum number of 9-1-1 calls at any one time and this information will be needed for any NG9-1-1 system RFP. In NG9-1-1, all 9-1-1 trunks and the associated costs will be replaced by the ESInet and NGCS costs as discussed in Section 2. Below is the information obtained about 9-1-1 trunks in Wisconsin.

Number of 9 1 1 Trunks/Lines		
	Total Number of Trunks	**Avg. 9-1-1 trunks**
# of 9-1-1 trunks	653	6
	Responded	96

The 9-1-1 trunks reported here represent a mix of categories that break down as follows:

- Dedicated Wireline only 9-1-1 trunk
- Dedicated Wireless only 9-1-1 trunk
- Mixed 9-1-1 trunk (all 9-1-1 call types)

Based upon site visits and the responses to the Survey, PSAPs in Wisconsin generally have dedicated trunks for wireline 9-1-1 calls and separate dedicated trunks for wireless 9-1-1 calls.

For example, a two position PSAP could have reported four 9-1-1 trunks, two for wireline 9-1-1 calls and two for wireless 9-1-1 calls. Having dedicated 9-1-1 trunks for wireline/wireless in legacy 9-1-1 is not uncommon across the country. In a NG9-1-1 environment, the capacity and connectivity to the ESInet is determined by the amount of 9-1-1 calls not the type of 9-1-1 calls.

The dedicated trunk model does tend to duplicate 9-1-1 costs while not necessarily increasing capability. For example, a two position PSAP can only answer two 9-1-1 calls at any given time. If they have dedicated trunks, as defined here, they could get four 9-1-1 calls (two wireline and two wireless) but not have four telecommunicators to answer the four calls. Overall service may be impacted from time to time in this scenario. NG9-1-1 focuses more on the ability of a PSAP to answer a 9-1-1 call at any given time versus a dedicated set

of circuits methodology.

There can be a correlation between the number of 9-1-1 positions and 9-1-1 trunks. In Wisconsin, those numbers are statistically identical at 641 versus 653, but given the duplication of trunks for dedicated wireless and wireline 9-1-1 calls, the correlation is not as strong in Wisconsin. These findings and the Survey responses confirm that there are excess 9-1-1 trunks in the current 9-1-1 system when compared to the number of 9-1-1 answering positions.

3.1.4 Number of 9-1-1 Staff

The PSAPs were asked to provide PSAP staffing information as part of their submission. PSAP staffing is another area that can drive 9-1-1 costs, can be tied to system capacities, and corroborates other aspects of the data collected by the PSAP Assessment Survey. The Survey asked PSAPs to provide information about their staffing related to 9-1-1 operations. The table below provides a breakdown of the information provided:

PSAP Staffing Information	
Answer Choices	**Total Number**
Administrative Staff	134
Supervisors	252
Telecommunicators	1,604
Support personnel	126
Total	2,115
Responded	107

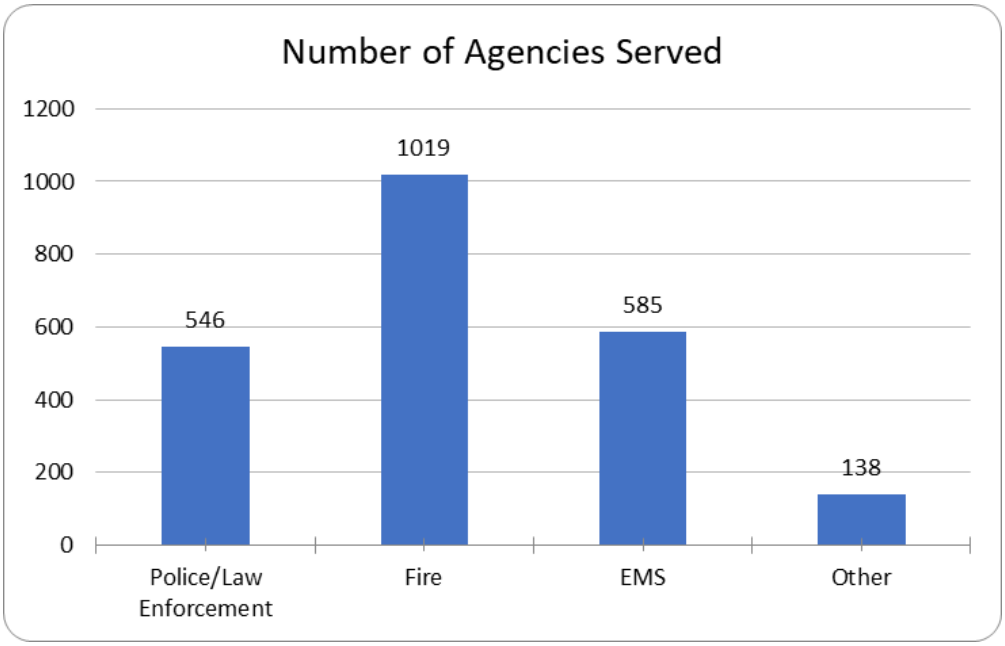
The staffing numbers as reported are consistent with the other data points collected during the PSAP Survey and consistent with staffing levels of states with similar demographics to Wisconsin. With 2,115 staff working in support of 108 PSAPs, 9-1-1 operations is an extensive workforce dedicated to public safety. Generally speaking, each PSAP has the authority and autonomy to hire, train, and schedule their PSAP workforce. There are no statewide hiring or training standards that govern who can or cannot be a 9-1-1 telecommunicator. As other states have transitioned to NG9-1-1, the adoption and implementation of statewide training standards has become a natural extension of the collaborative nature of NG9-1-1.

Staffing in a NG9-1-1 environment will likely require different skill sets like cybersecurity and networking or social media and texting. Personnel costs could be impacted by specialized skill sets or from the increased reliance on accurate data like GIS which will require an increase in maintenance activities.

3.1.5 Number of First Responder Agencies Served

The chart and table below summarize the number and types of first responder agencies served by Wisconsin PSAPs. According to the PSAPs that responded to this question, 2,285 agencies are dispatched in Wisconsin.

With Wisconsin having 72 counties and 122 PSAPs, there is inherent overlap and some double counting of first responder agencies across the PSAPs.

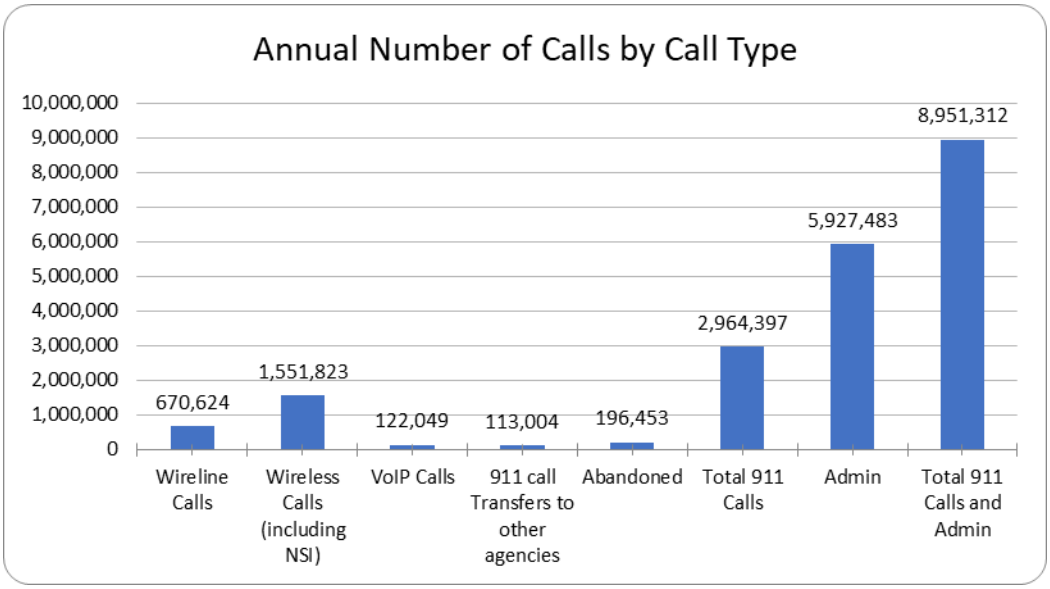


Number of Agencies Served by your PSAP		
Answer Choices	**Average Number**	**Total Number**
Police/Law Enforcement	5	546
Fire	9	1,019
EMS	6	585
Other	1	138
Total	-	2,288
Responded	107	

The number of first responder agencies served by the PSAPs demonstrates the impact a 9-1-1 call and the corresponding response to those calls can have in Wisconsin. While the numbers are large and generally fall in line with similar comparisons to other states, the numbers are inflated when totaled together in this Report. This is due to the fact that multiple PSAPs can serve multiple first responder agencies, especially fire and EMS. For fire service and EMS agencies in particular, a large and diverse state like Wisconsin is made up of mostly volunteer agencies that cover geographic areas that do not conform to political boundaries. PSAPs conform to political and jurisdictional boundaries as do most law enforcement agencies. For planning purposes, knowing the number of responding agencies served by the PSAPs, albeit inflated, is yet another component to use to validate the size of the 9-1-1 system both in the current environment and in NG9-1-1.

3.1.6 Number of 9-1-1 Calls

Current PSAP call volumes are very valuable information to have and help to correlate many of the other data points collected for this Report. The Survey asked the PSAPs about their annual 9-1-1 call volumes.



Annual Number of 9 1 1 Calls by Call Type		
Answer Choices	**Total**	**Average**
Wireline Calls	670,624	8,489
Wireless Calls (including NSI)	1,551,823	21,857
VoIP Calls	122,049	2,441
9-1-1 Call Transfers to other agencies	113,004	3,424
Abandoned	196,453	3,274
Total 9-1-1 Calls	2,964,397	31,875
Admin	5,927,483	66,601
Total 9-1-1 Calls and Admin	8,951,312	92,282
Responded	98	-

The call volumes reported by the PSAPs reflect a level of activity across the state that is consistent with the population of the state and will inform future NG9-1-1 planning, procurement, and implementations. This information will be vital to sizing the NG9-1-1 system as it relates to expected call volumes any NG9-1-1 system will be required to accommodate.

3.2 PSAPs Identified by this Assessment

One of the main objectives of the statewide 9-1-1 telecommunications system assessment is to identify and classify each operating PSAP in Wisconsin. This information is crucial in determining many fundamental elements of the 9-1-1 system across the state.

There are distinctions between PSAPs that need to be defined in order to fully understand the operational picture of 9-1-1 in Wisconsin. PSAPs in Wisconsin can be defined as identified below. Please note that a single PSAP can operate in multiple roles as defined based on the situation or 9-1-1 call type. This is consistent with 9-1-1 operations in other parts of the country.

PSAP Definitions from the NENA Master Glossary (*NENA ADM 000.22 2018, 04/13/2018)*	
PSAP (Public Safety Answering Point)	An entity responsible for receiving 9-1-1 calls and processing those calls according to a specific operational policy.
Primary PSAP:	A PSAP to which 9-1-1 calls are **routed directly** from the 9-1-1 Control Office.
Secondary PSAP:	A PSAP to which 9-1-1 calls are **transferred from** a Primary PSAP.
Alternate PSAP:	A PSAP designated to receive calls when the primary PSAP is unable to do so.
Consolidated PSAP:	A facility where multiple Public Safety Agencies choose to operate as a single 9-1-1 entity.

Each of these PSAP classifications exist in Wisconsin. From a NG9-1-1 perspective, a PSAP's classification can determine the level of NG9-1-1 services delivered to a specific location or the kind of ESInet connection. For example, in some states, secondary PSAPs are not eligible for direct connection to the ESInet and NG9-1-1 core services unless certain operational requirements are met. An example of an agency that typically operates as a secondary PSAP is the State Patrol/Police. Many states have leveraged their NG9-1-1 system investment to incorporate their State Patrol/Police agency given their unique response requirements across the state.

On the following page is a list of PSAPs identified from the Survey and additional analysis completed for the Assessment. It should be noted that the following list is not all inclusive and there may be additional PSAPs in the state that were not identified during the Survey analysis.

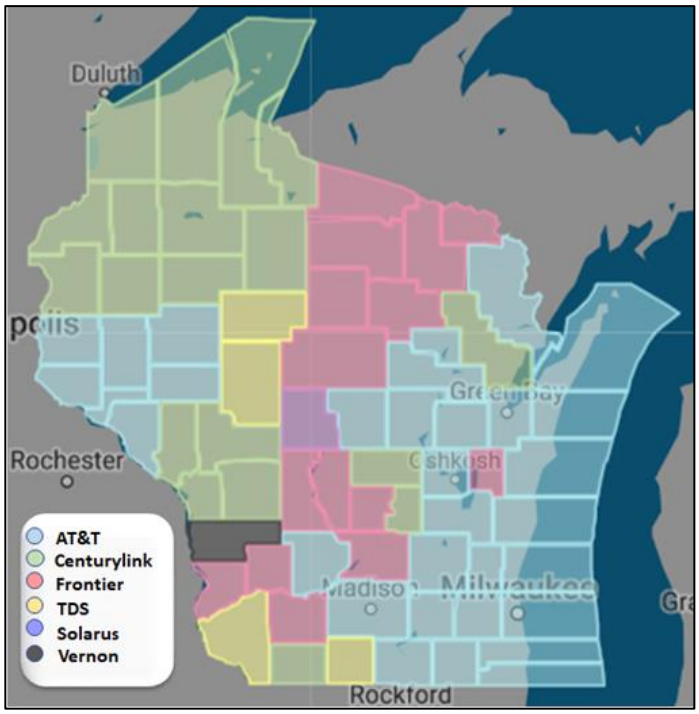
Primary Wireless & Wireline Direct (78)				
Adams County SO	Dodge County SO	Juneau County SO	Oneida County E911 Center	St Croix County Emergency Comm
Ashland County 911 Comm Center	Door County SO	Kenosha Joint Services	Outagamie County SO	Taylor County SD
Barron County SD	Douglas County 911	Kewaunee County SD	Ozaukee County SD	Trempealeau County SO
Bayfield County Comm Center	Dunn County Emergency Comm	La Crosse County PSC	Pepin County SO	Vernon County SO
Bayside Communications	Eau Claire Comm Center	Lafayette County SO	Pierce County SD	Vilas County SD
Brown County PSC	Florence County SO	Langlade County SO	Polk County SO	Walworth County SO
Buffalo County SD	Fond du Lac County Comm	Lincoln County SO	Portage County SO	Washburn County SO
Burnett County SO	Forest County SD	Manitowoc County SO	Price County SO	Washington County SO
Calumet County SO	Fort Atkinson PD	Marathon County SO	Racine County Comm	Watertown PD
Chippewa County SO	Grant County SO Dispatch Center	Marinette County Dispatch	Richland County SD	Waukesha County Communications
City of Brodhead PD	Green County SD	Marquette County SO	Rock County Comm Center	Waupaca County Dispatch Center
City of Middleton PD	Green Lake County SO	Menominee County 911 Center	Rusk County SO	Waushara County SO
Clark County SO Comm Center	Iowa County SO	Milwaukee County OEM 911 Comm	Sauk County SO	Winnebago County Comm Center
Columbia County SD	Iron County SD	Milwaukee PD	Sawyer County SD	Wood County Dispatch Center
Crawford County Comm Center	Jackson County Comm Center	Monroe County 911 Comm Center	Shawano County 911	
Dane County PSC	Jefferson County SO	Oconto County 911 Center	Sheboygan County Emergency Comm Center	
Primary Wireline Only (30)				
Cedarburg PD Dispatch Center	Franklin PD	Minocqua PD	Village of Mukwonago PD	Wisconsin Dells PD
City of Muskego PD	Fort McCoy 911	Oak Creek PD	Village of Germantown PD	Wisconsin State Capitol PD
City of Ripon	Greendale PD	Oconomowoc PD	Wauwatosa PD	
City of Waukesha	Greenfield PD	Platteville PD	West Allis PD	
Cudahy PD	Hartford PD	South Milwaukee PD	West Bend PD	
Delavan PD	Lake Geneva PD	Reedsburg PD	West Milwaukee PD	
Elm Grove PD	Mequon PD	UW-Madison PD	Whitewater PD	
Secondary Wireline & Wireless Transferred In (4)				
Division of State Patrol/TMC	Milwaukee Fire Dispatch	Wisconsin DNR	Sun Prairie PD (LE Dispatch Only)	
TBD (10)				
Burlington PD	Marquette University PD	U.S. Coast Guard – Lake Michigan Sector	UW-Milwaukee	Wgema Campus PD
Monroe PD	Pleasant Prairie PD	U.S. Veterans Affairs PD	Volk Field Air National Guard Base	Wisconsin State Fair (seasonal)

As it exists, the current PSAP classifications represent a split in processing 9-1-1 calls based on how the call originates, wireline or wireless. Most wireless calls are answered by the Primary PSAP in a given county (usually the county PSAP) who then potentially transfers that wireless 9-1-1 caller to the Municipal PSAP if that caller is within one of the jurisdictions identified as Primary Wireline Only. If a caller from that jurisdiction calls 9-1-1 from a wireline phone, the call goes directly to that PSAP and is not transferred between PSAPs. Given that upwards of 80% of all 9-1-1 calls originate on a wireless phone, the 9-1-1 call transfers in these scenarios are higher and more time consuming than if processed by one agency directly. This is an operational challenge that can be mitigated by a transition to NG9-1-1.

3.3 Current 9-1-1 Call Delivery Network

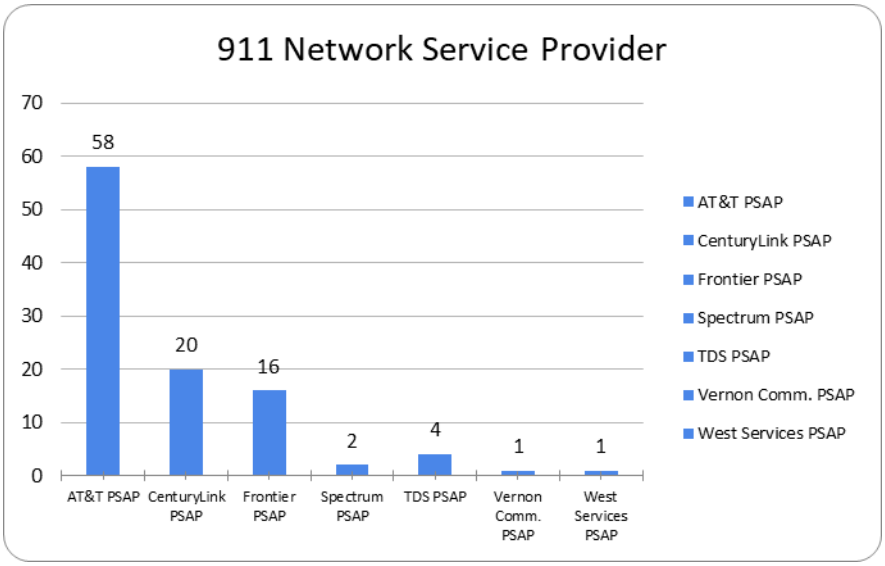
Based on information provided by the Wisconsin State Telecommunications Association (WSTA) in 2016, there are 15 selective routers in the state, each of which routes 9-1-1 calls to the PSAPs across the state. These 9-1-1 selective routers are operated by several different companies based on geography and service areas. A PSAP's location in the state will determine what 9-1-1 selective routers it connects to via 9-1-1 trunks and receives 9-1-1 calls from, and generally determines who the 9-1-1 network service provider is for the PSAP.

The PSAP Survey asked the PSAPs to identify who their 9-1-1 network service provider is. When those answers are plotted on a map, this is what the service provider map looks like for Wisconsin by county.



9-1-1 Service Providers by County

The chart and table below provide the breakdowns by 9-1-1 service provider based on the Survey results. The information is reflective of and consistent with other states in that there are usually multiple providers of legacy 9-1-1 service which is largely due to the evolution of landline telephony in the 19th and 20th centuries.

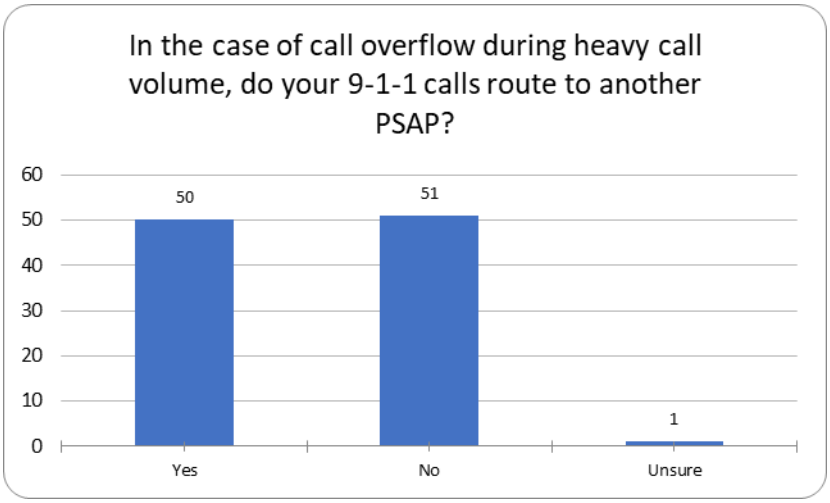


Who is your 9 1 1 network service provider?	
Answers	**Responses**
AT&T	58
CenturyLink	20
Frontier	16
Spectrum	2
TDS	4
Vernon Comm.	1
West Services	1
Total	102

Each of these 9-1-1 service providers represent existing 9-1-1 costs, legacy infrastructure, and Originating Service Provider (OSP) connections that will need to be replaced by or transitioned to a NG9-1-1 system. This is critical information needed to properly plan and execute PSAP transitions, estimate costs, and influence timelines. Each of these 9-1-1 service providers will require coordination, planning, and testing outreach during the transition to NG9-1-1.

3.3.1 Legacy 9-1-1 Call Flow Challenges

The Survey asked PSAPs to identify what happens to their 9-1-1 calls when they are busy and cannot answer a 9-1-1 call because they are already working on other 9-1-1 calls, known as an overflow scenario. In a legacy 9-1-1 call flow environment and as seen in Wisconsin, what happens to overflow 9-1-1 calls depends on who your 9-1-1 service provider is and what capabilities a PSAP has to answer 9-1-1 calls presented on other systems, like the administration phone or 10-digit non-emergency number. Here is what the PSAPs reported regarding 9-1-1 call overflows in Wisconsin:



In the case of call overflow during heavy call volume, do your 9 1 1 calls route to another PSAP?	
Answers	**Responses**
Yes	50
No	51
Unsure	1
If Yes, please provide name of PSAP. If No, please explain what happens to those calls	63
Responded	102

Roughly half of the PSAPs responded that their 9-1-1 calls do not overflow or go to another PSAP for answering and processing. The PSAP Survey asked the PSAPs to describe what happens to those 9-1-1 calls if they do not overflow or route to another PSAP for processing.

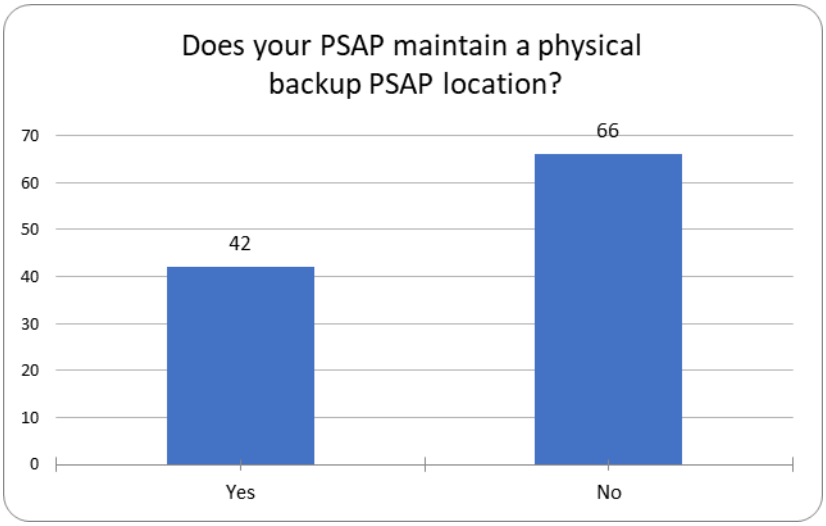
Here are some of the responses from the Survey:

PSAP Responses	
No	However, our cell calls are answered by XXXX County, so if we have too much volume, they can't transfer us the calls, so they have them still.
No	911 calls roll over 2 additional non-emergency lines. if all are full, they get a busy signal.
No	Callers receive a busy signal.
No	Only route to another PSAP if problem with the network.
No	Busy Signal.
No	Callers receive a busy signal
No	Overflow 911 calls will route to our non-911 business phone lines.
No	The caller receives a fast/busy signal.
No	Call attempts receive a system busy signal from the LEC. PSAP has 12 inbound trunks with a traffic study identifying 8 being required.
No	Caller receives a busy signal
No	Any calls that we are not able to answer, end up ringing on our lines until we do answer

Generally, it is the intent of every PSAP to answer each and every call intended for it. The ability to do so can be limited by many things beyond the control of any one PSAP and what happens to an overflow 9-1-1 call may or may not be within the control of the PSAP.

In NG9-1-1, the ability for a call to go from one PSAP to another based on current network or operating conditions is part of the design and operational capabilities of NG9-1-1. **9-1-1 callers will no longer receive a fast busy or not be connected to a PSAP in a NG9-1-1 environment.**

Another similar and related PSAP issue created by legacy 9-1-1 call flow centers is the fact that some PSAPs have a physical backup facility that typically houses a backup CHE/CPE system and duplicate 9-1-1 connections to the legacy 9-1-1 service provider for the purposes of remaining operational during times of trouble or outage. The PSAP Survey asked the PSAPs if they have a physical backup location for answering 9-1-1 calls. Here is what the PSAPs reported:



Forty-two PSAPs that responded said they maintain a physical backup location for 9-1-1, however, the majority of PSAPs in Wisconsin do not have or maintain a physical backup. Physical PSAP backups are not unique to Wisconsin. In some jurisdictions, a physical backup location with duplicated systems and costs is warranted. The challenge for PSAPs and backups comes from the fact that the design and architecture of the legacy 9-1-1 system requires a PSAP to duplicate all costs, connections, and physical buildings associated with their main PSAP. For many PSAPs, that is cost prohibitive.

In NG9-1-1, physical backups are not required for most PSAPs to remain operational. With NG9-1-1 dynamic call routing, 9-1-1 calls destined for a particular PSAP can automatically be sent to a predetermined location if the intended PSAP is unavailable for any reason. However, larger PSAPs will often maintain a physical backup even with a NG9-1-1 system, given that few other PSAPs can successfully process a large PSAPs' 9-1-1 call volumes.

3.4 Current 9-1-1 Call Handling Equipment (CHE/CPE)

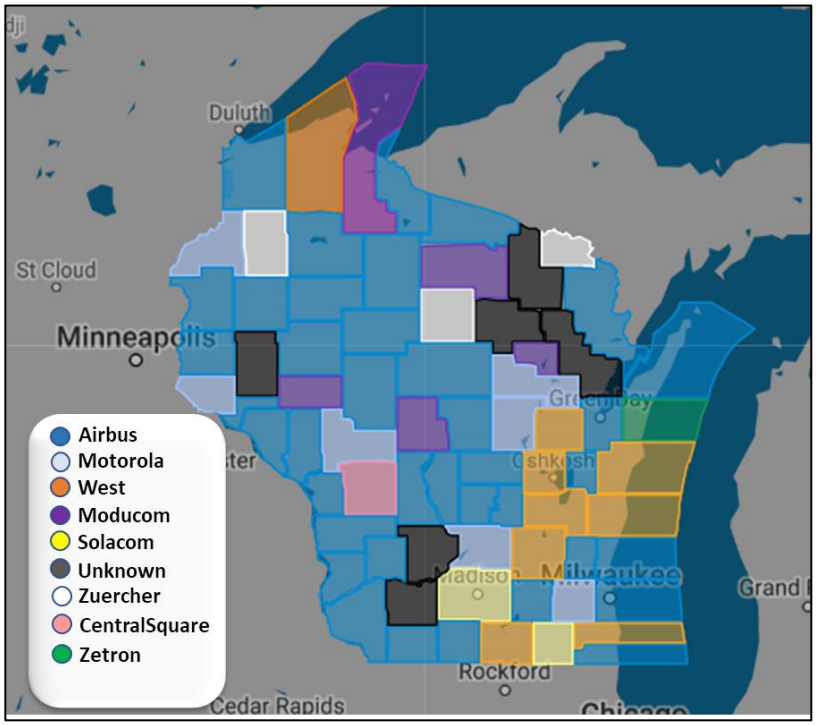
An area of focus for this Report is to understand the current CHE/CPE systems operating in Wisconsin. The PSAP Survey asked several questions related to a PSAPs CHE/CPE, with the intent of gathering enough information to make a determination of NG9-1-1 readiness of any particular PSAP in the state. While the information provided is extremely valuable and informative, some errors or mislabeling of information from the PSAPs exists and it is possible that a PSAP could be identified as not ready when in fact they are and vice-versa.

There is a broad representation of CHE/CPE systems in the PSAPs of Wisconsin. The list of manufacturers reported by the PSAPs includes:

PSAP CHE/CPE Vendors and Products as reported			
Airbus	Cassidian	Central Square	CML
ECS-1000	Emergency Call Works	Intrado	ModuCom
Motorola	Plant	Positron	Sentinal
Solacom	Viper	Vesta	West
Zetron	Zuercher		

While the list includes many names, the reality is the responses from the PSAPs mixed old company names, new company names, and old product names with new product names. For instance, Motorola owns all of the companies formally known as Airbus, CML, Cassidian, Emergency Call Works, Plant, and Vesta. The span of time reported by the PSAPs for the CHE/CPE systems ranges from a reported purchase date of 1996 to February 2019.

Below is the distribution of CHE/CPE by manufacturer across the state based on responses to the PSAP Survey.



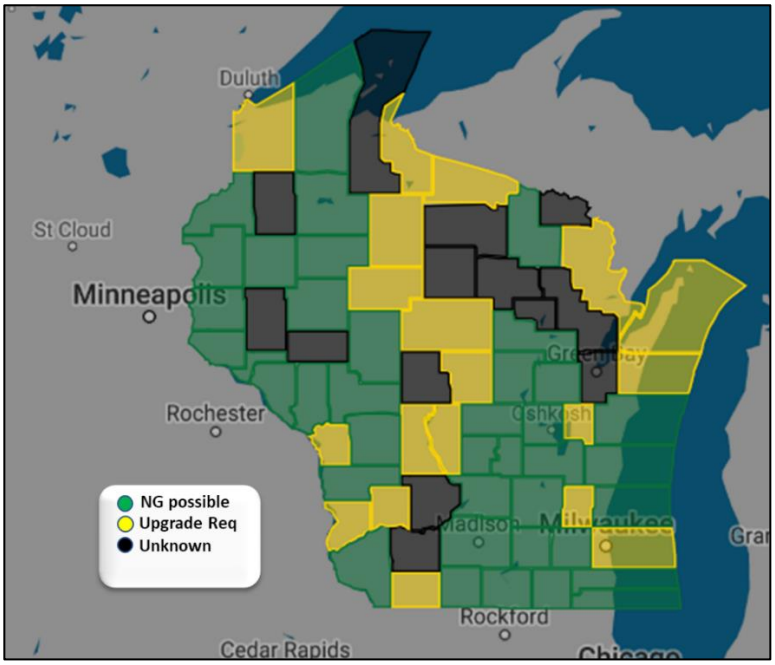
CHE by County

Are Wisconsin PSAPs ready for NG9-1-1?

When analyzing the PSAP responses to the CHE/CPE system questions, attention was paid to the provided make, model, version, and installation/purchase date of the CHE/CPE system. Having all or some of this information is useful in deciding a PSAPs NG9-1-1 CHE/CPE readiness. An assumption used in our analysis is

that any CHE/CPE purchased prior to 2016 would not be considered NG9-1-1 capable without additional costs by the PSAP. An alternative assumption used is that any PSAP CHE/CPE systems purchased after 2015 are NG9-1-1 capable and would interface to and be able to operate with minimal configuration change when connected to a NG9-1-1 system. Based upon our response analysis, the following information pertains to the CHE/CPE readiness of PSAPs in Wisconsin:

PSAP CHE/CPE NG9 1 1 Readiness Assessment	
PSAPs Reporting NG9-1-1 Capable CHE/CPE	49
PSAPs Reporting Non-NG Ready CHE/CPE	49
PSAPs unknown	9
Responded	107

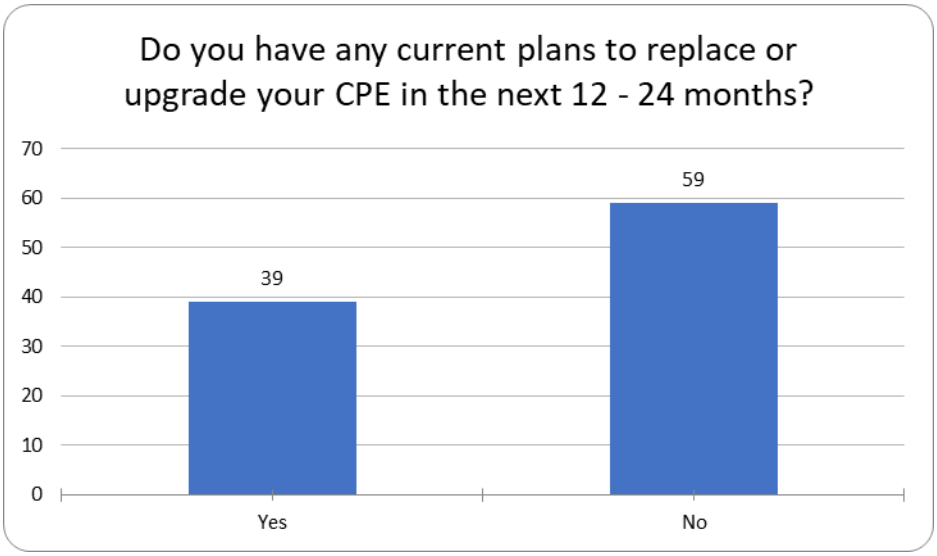


CPE/CPE NG Ready/Not Ready

Roughly 50% of the PSAPs in Wisconsin have a CHE/CPE system that should require little or no modification when transitioned away from receiving 9-1-1 calls from the legacy 9-1-1 system to receiving calls from a NG9-1-1 system using Session Initiation Protocols (SIP). That is not to say there will be no costs involved in the transition, it means that the CHE/CPE system itself will not require replacement when the PSAP is transitioned over to the NG9-1-1 system.

Conversely, roughly 50% of the PSAPs in Wisconsin will require an upgrade or replacement of their CHE/CPE system in order to take full advantage of the features, functions, and capabilities of the NG9-1-1 system. It should be noted that a PSAP is not required to have a NG9-1-1 capable CHE/CPE system in order to interoperate with and process calls via the ESInet. A Legacy PSAP Gateway (LPG) allows for PSAPs to remain on their current CHE/CPE systems until such time they are able to invest in a new CHE/CPE system or solution that is able to take full advantage of the features and functions of NG9-1-1.

The PSAP Survey asked PSAPs if they have any plans to replace their CHE/CPE system in the next 12 – 24 months. Here is what the PSAPs reported:



Any current plans to replace or upgrade your CHE/CPE in the next 12 24 months?	
Answers	**Responses**
Yes	39
No	59
If yes, how will the replacement /upgrade be funded?	37
Answered	98

Twenty-nine of the PSAPs that reported having a CHE/CPE system that is not ready also reported plans to replace their CHE/CPE system regardless of what the state does relative to NG9-1-1. Conversely, 20 PSAPs that reported having a CHE/CPE system that is not ready do not have plans to upgrade in the next 12-24 months.

If a PSAP reported a pending upgrade, the Survey asked them to share how they intended to pay for the pending upgrade or purchase. Here is a sample of the responses from the PSAPs on how CHE/CPE system changes would be funded:

Yes	County Budget, Grants if available
Yes	City and County funds-we don't have a choice-Moducom went out of business.
Yes	County Funds
Yes	Tax levy if approved
Yes	Budgeted
Yes	Budget request is in for next year
Yes	The County will have to borrow the funds. Needless to say, this is VERY frustrating since enough money has been collected from the wireless fund to have covered the cost. This is double taxation of the highest order.
Yes	Text to 911 capability - grants if possible, tax levy if not
Yes	County Capital Project
Yes	Hopefully grants, and county funding.
Yes	We need to move ahead as support for the ECS1000 is questionable per CenturyLink. County tax base funding.
Yes	Equipment is at end of life, no funding source available as of yet.
Yes	County Budget funds, TBD
Yes	Borrowed Funds
Yes	We are in the process currently to upgrade our Phone & Radio Systems. This will be funded by a State Trust Loan.
Yes	Current call handling system is end of life. We budgeted last year for a replacement.
Yes	Local County funding
Yes	Will need to purchase new workstations and refresh servers as part of a 5-7 year life cycle of equipment
Yes	Self Funded
Yes	Budget - tax levy
Yes	Capital expenditure
Yes	We have already budgeted to replace our equipment, which will be replaced in 2019
Yes	2020 / County funded
Yes	New public safety building with new dispatch equipment
Yes	Budget dollars and possibly county reserve funding dollars

3.5 Findings and Conclusions

The following list summarizes the findings and conclusions for current 9-1-1 services in Wisconsin:

- 9-1-1 in Wisconsin is consistent with other states and jurisdictions when comparing the numbers for population, PSAPs, call volumes, positions, staff etc.
- There is a large patchwork of different systems, service providers, capabilities and resources across the state making coordination and communications imperative as the transition to NG9-1-1 takes place.
- The current 9-1-1 telecommunications infrastructure in Wisconsin supports the PSAPs in Wisconsin but will not support NG9-1-1 technology and capabilities and needs to be replaced.
- The current system has created operational scenarios at PSAPs that may no longer be necessary when operating on a NG9-1-1 system. Examples include 9-1-1 call overflow, backup PSAPs, and 9-1-1 call transfers. Removing these will lead to better service, reduced costs, and improved response at the local level.
- About 50% of the PSAPs are prepared for a transition to NG9-1-1 when analyzing the age and type of 9-1-1 Call Handling Equipment (CHE, also known as Customer Premise Equipment (CPE)) in operation today based on the Survey results. Of the remaining 50% that are not ready, 29 reported plans to replace their CHE/CPE system with a NG9-1-1 "capable" system in the next 12-24 months, which would bring the new percentage of PSAPs prepared for the transition to around 75%.

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4 NG9-1-1 Assessment

This section of the Report will focus on the following areas relevant to NG9-1-1 in Wisconsin and how these areas will change in this new 9-1-1 environment:

1. NG9-1-1 and PSAP Operations
2. GIS in NG9-1-1

4.1 NG9-1-1 and PSAP Operations

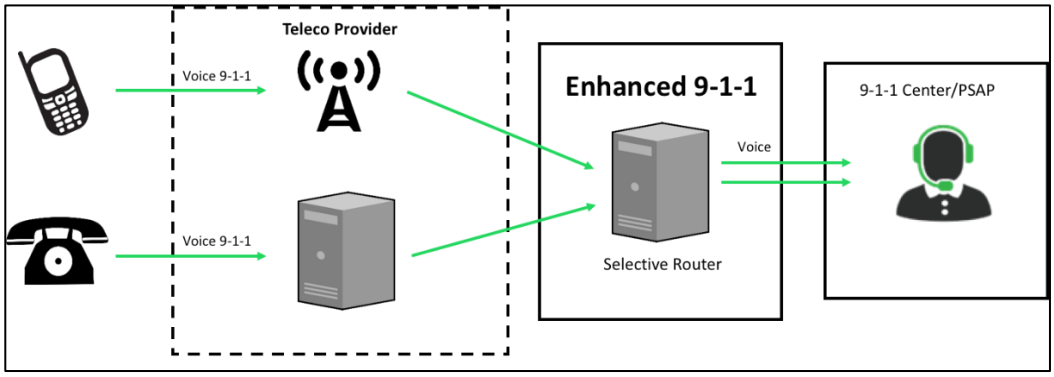
This section of the Report will explore the various ways operating on a NG9-1-1 system will be different than the legacy 9-1-1 system and how those differences can affect PSAP operations in Wisconsin, which includes the following areas:

- NG9-1-1 Call Flow
- Physical Backups and 9-1-1 Call Overflow
- 9-1-1 Call Transfers
- Text-to-9-1-1
- Training and Protocols

4.1.1 NG9-1-1 Call Flow

9-1-1 call flow in NG9-1-1 is different than the legacy 9-1-1 system. Understanding the differences is important to understanding how NG9-1-1 can address the challenges legacy 9-1-1 call flow creates in Wisconsin.

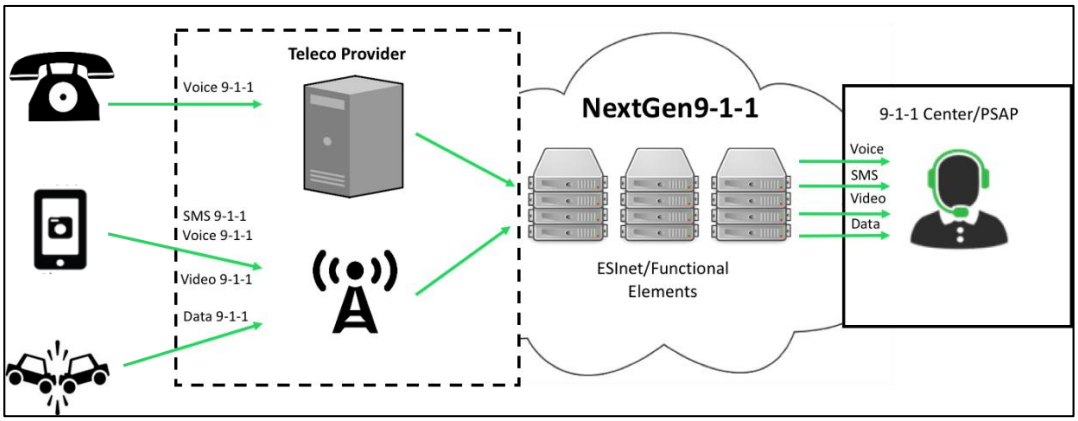
The diagram below shows a simplified legacy 9-1-1 system. 9-1-1 calls enter the system on the left of the diagram and progress through a series of analog connections and the legacy Selective Router (SR) to one of the PSAPs connected to that SR.



The diagram shows dedicated, point to point connections between legacy elements that are used to selectively route a 9-1-1 call to a PSAP. All 9-1-1 calls in Wisconsin rely upon these kinds of dedicated connections built to

specific PSAPs in order to process 9-1-1 calls. What SR a PSAP connects to is based largely on where the PSAP is physically located and the evolution of the telephone networks over the 19th and 20th centuries. Not all Wisconsin PSAPs are connected to all Wisconsin 9-1-1 SRs.

The following diagram represents a simplified NG9-1-1 system. Similarly, calls enter the diagram on the left and progress through a core routing function which then sends the 9-1-1 calls on to the PSAPs that are connected to the ESInet.



The NG9-1-1 diagram shows many more connections and functions involved in processing a 9-1-1 call. This visually demonstrates a major difference between how a 9-1-1 call gets received, processed, routed, and delivered in the legacy and NG9-1-1 environments.

In legacy 9-1-1, the 9-1-1 call relies on dedicated trunks connecting a SR to a PSAP. In NG9-1-1, the 9-1-1 call relies on a session being established between the 9-1-1 caller and the PSAP via Session Initiation Protocol (SIP). The NG9-1-1 call session relies upon the ESInet, which relies on multiple paths and connections to connect to all PSAPs. This allows for the NG9-1-1 system to send 9-1-1 calls to any PSAP that is connected to the ESInet, regardless of where the 9-1-1 came from or how it came into the system.

This basic difference, multiple paths and connections versus limited dedicated trunks delivering 9-1-1 calls to the PSAPs, begins to address the legacy challenges identified in Section 3.3 and allows for operational change to occur in Wisconsin.

4.1.2 Physical Backups and 9-1-1 Call Overflow

As noted previously, there are PSAPs in Wisconsin that maintain physical backups as well as PSAPs whose 9-1-1 calls will ring to a “fast busy” if the PSAP is overloaded. These situations exist primarily as a result of the limitations inherent in the design of the legacy 9-1-1 system. Specifically, the challenges addressed by

NG9-1-1 include:

- Physical PSAP Backups
- 9-1-1 Call Overflow

Physical PSAP backups

Based on the Survey results, at least 42 PSAPs in Wisconsin maintain a physical backup for their PSAP. This typically means there are duplicate 9-1-1 connections, systems, and costs associated with maintaining a physical PSAP backup. There are operational reasons for PSAPs to maintain physical backups, but NG9-1-1 makes every other PSAP in the state a virtual backup PSAP.

NG9-1-1 would make it possible for some PSAPs to decommission their backup PSAPs, eliminating the duplicate costs and systems, which could result in significant savings over the long term at the local level. The ability for a PSAP to back up another PSAP in NG9-1-1 will require an increase in cooperation, communication, and data sharing between agencies. It may be necessary, from an operational standpoint, for larger PSAPs to maintain a physical backup in the event that diverting their 9-1-1 call traffic would result in cascading overloads of smaller PSAPs across a region or the state. The inherently flexible location-based routing capabilities of a NG9-1-1 system will provide many alternative backup arrangements for PSAPs to consider as the transition to NG9-1-1 takes place.

9-1-1 Call Overflow

Another legacy challenge identified in Section 3.3 is what was referred to as 9-1-1 call overflow. According to the Survey results, 51 PSAPs do not overflow their 9-1-1 calls to another PSAP if they are busy and cannot answer the call. Many of these 9-1-1 calls go unanswered or result in the caller hanging up and sending another 9-1-1 call into the system.

NG9-1-1 will ensure that all 9-1-1 calls are answered regardless of what is happening at any given PSAP. The dynamic call routing design of the NG9-1-1 system will automatically overflow a 9-1-1 call to another, pre-designated PSAP or series of PSAPs until the call is answered. This is accomplished via a NG9-1-1 system function known as a Policy Routing Function (PRF).

Operationally, PSAPs will need to be a part of the planning and configuration of the PRF in a NG9-1-1 system. Sending a 9-1-1 call to a PSAP is easy to do from a technical standpoint in NG9-1-1, but dispatching, paging first responders, activating warning sirens, and LMR communications for another PSAP is a different operational challenge not directly addressed by the NG9-1-1 system.

4.1.3 9-1-1 Call Transfers

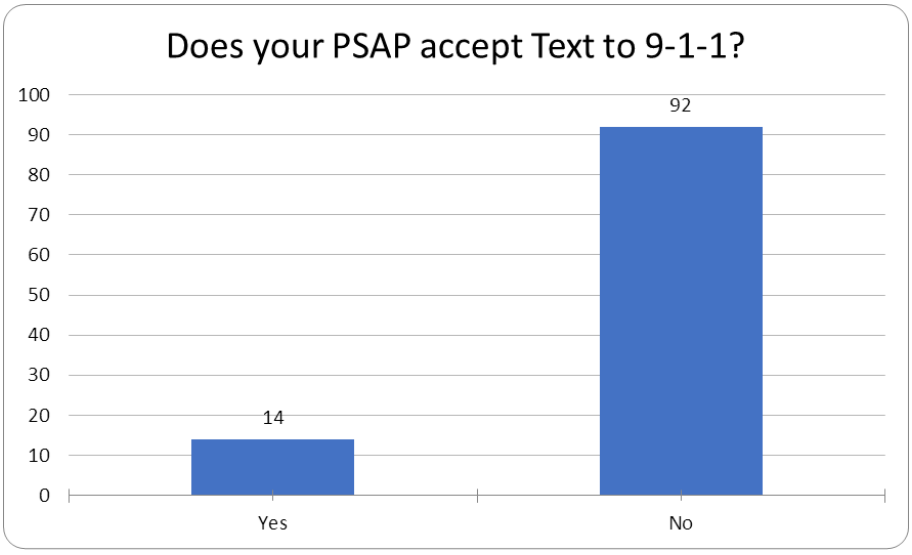
Transferring a 9-1-1 caller is an operational reality for a PSAP, especially for certain types of 9-1-1 calls like wireless/cellular 9-1-1 calls. If a PSAP is a secondary PSAP, one that does not directly get 9-1-1 calls, a transferred call is often only the voice call and does not include ALI or location information for the caller. This often requires additional interrogation of the caller and a delayed dispatched response. According to the PSAP Survey, there are over 30 PSAPs that get wireless 9-1-1 calls transferred to them from another PSAP. All wireless 9-1-1 calls for roughly 30% of Wisconsin PSAPs are handled twice.

NG9-1-1 mitigates the challenges with 9-1-1 call transfers in two primary ways. The first comes from the ability of the NG9-1-1 system to dynamically route and ultimately geo-route 9-1-1 calls based on location data. For the 30 PSAPs discussed here, the NG9-1-1 system would automatically route all calls, including wireless 9-1-1 calls, to that PSAP based on the location of the call and the caller would not be transferred between PSAPs.

The second 9-1-1 call transfer challenge relates to the fact that a typical call transfer between PSAPs served by different carriers or Selective Routers cannot send ALI location data with the 9-1-1 call transfer. With the NG9-1-1 system, all PSAPs are served by and connected to the same routing cores and if a call is transferred from any PSAP to any other PSAP across the state, the location data is available for that call and will be provided to the transferred agency.

4.1.4 Text-to-9-1-1

Text-to-9-1-1 is a service available for deployment in Wisconsin PSAPs today. The following chart shows the number of PSAPs in Wisconsin that are operational with some form of Text-to-9-1-1.

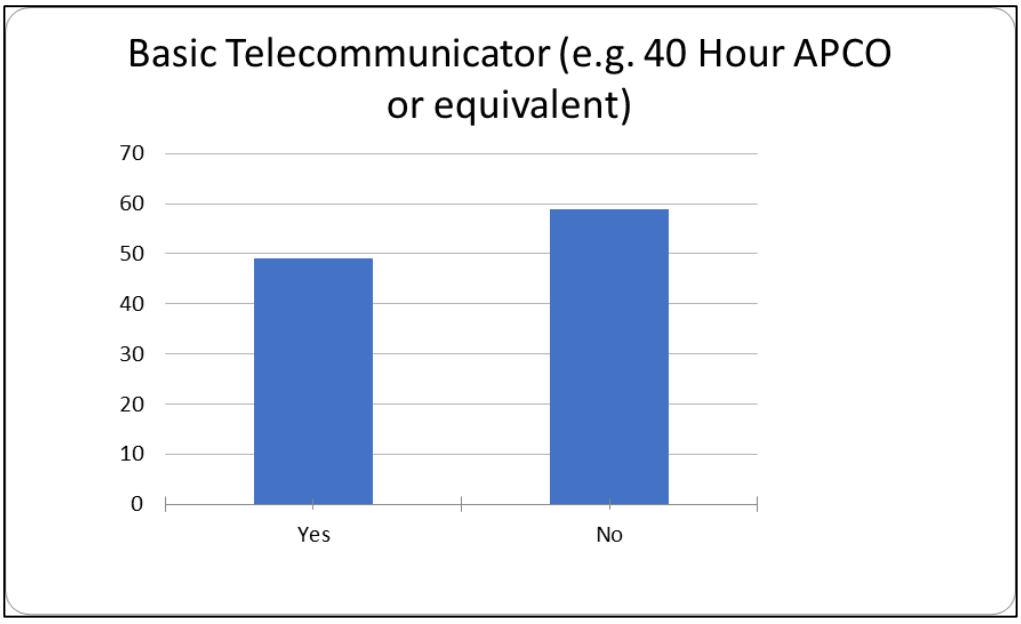


Operating on a NG9-1-1 system is not required to deploy Text-to-9-1-1 service. In states that have deployed NG9-1-1 systems, statewide Text-to-9-1-1 service is part of the system and deployment of the service is simplified and coordinated at the state level. Prior to any Text-to-9-1-1 deployment, PSAPs will need to make decisions on the deployment methods for Text-to-9-1-1. Ultimately the CHE/CPE of the PSAP will be required to process a Text-to-9-1-1 session on the same workstation and application that 9-1-1 calls are processed.

4.1.5 Training and Protocols

The transition to NG9-1-1 brings with it more than just changes in equipment at the PSAP. New systems, new tools, new processes all add to the demands placed upon telecommunicators when processing 9-1-1 calls. Given that NG9-1-1 primarily moves away from a system designed to handle landline 9-1-1 calls to a system that can process multiple types of calls, it is likely that lack of training could become an obstacle to the deployment of NG9-1-1 at the PSAP. Training will be necessary to operationalize many of the capabilities promised by NG9-1-1.

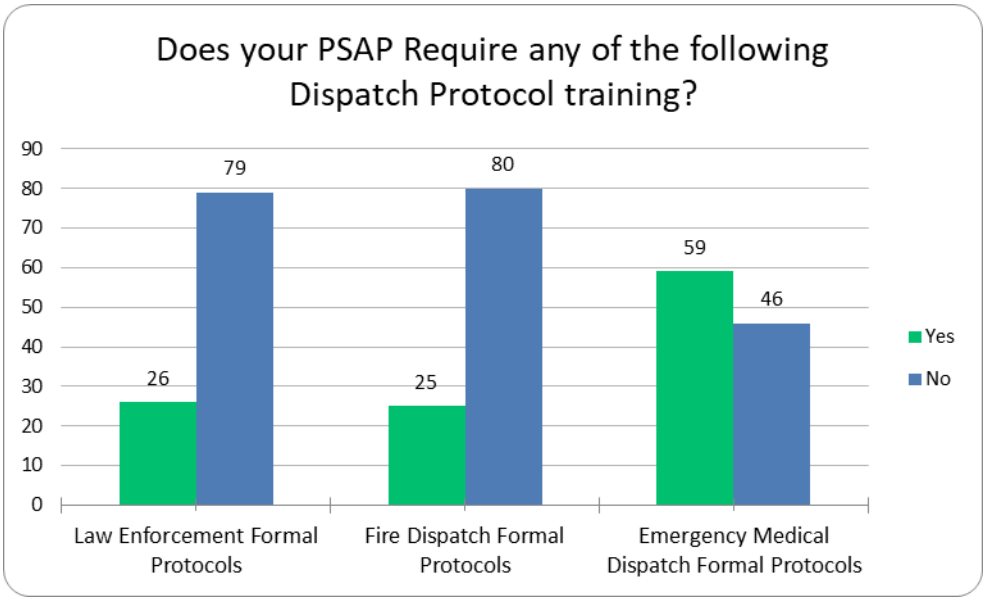
The PSAP Survey asked PSAPs about training and protocols currently in place. The chart below provides the breakdown on PSAPs that require some form of formal basic 9-1-1 training for telecommunicators.



The Survey responses from 49 PSAPs indicated they require some form of certified basic telecommunicator training. Forty-two of the 57 who do not require certified basic telecommunicator training stated that they are providing 8 weeks to 18 weeks of an in-house training program with department protocols.

Another question on the Survey asked the PSAPs to report on any 9-1-1 protocols used in the PSAP for call

interrogation. The chart below provides the results from the PSAPs.



A large number of PSAPs (56%) identified Emergency Medical Dispatch (EMD) protocol training is required. Nearly 23% of respondents stated that they require discipline specific protocol training for law and fire dispatchers.

Other training/protocols identified include:

- CPR
- TIME
- NCMEC
- NIMS

The ease with which a NG9-1-1 system can dynamically route calls between PSAPs will quickly highlight differences in training and protocols across the state. Other states, while implementing NG9-1-1 systems, have also encouraged and supported equal service with programs like minimum training standards or the adoption of protocols like EMD. Given the existing level of support from the PSAPs for both basic telecommunicator and protocol specific training as reported in the Survey, it could serve as a foundation for standardizing PSAP training in Wisconsin.

4.2 GIS in NG9-1-1

Historically, all 9-1-1 calls are delivered to a PSAP by a telecommunication Originating Service Provider (OSP). The OSP is responsible for carriage and delivery of a call to the correct PSAP using a database that has been largely defined by the physical location of a device or agent capable of dialing 9-1-1.

This database (referred to as the Selective Router Database or SRDB) is a collection of all of the service order records that link a telephone number to a physical address. In 9-1-1 systems this framework minimizes the variability of locations by defining exactly where a call goes based upon a fixed attribute in the database.

The SRDB functionality has worked well; however, new technology, user mobility, and applications available to consumers are not as fixed as they were when the system was originally implemented.

Today, the devices and systems that can trigger an emergency call have caused the existing 9-1-1 systems to pursue several augmentations, patches, and significant system upgrades to meet the demand in attempts to increase the ability of the fixed location-based system to handle mobile (non-fixed location) devices.

The preferred method of routing calls in NG9-1-1 and in the future is geographically. Using the spatial ability of Geographic Information Systems (GIS) that utilize attributes specifically structured for call routing offers a significant enhancement to 9-1-1. These systems allow for the call information systems to query the maps and databases to route a call to the correct PSAP instead of using a fixed system that is not presently based upon geography.

PSAPs across Wisconsin utilize GIS as a tool in many ways. Most utilize GIS as a tool to manage the Master Street Address Guide (MSAG) which is developed by a PSAP to validate the Automatic Location Identification (ALI). In most cases, this means a minimal GIS spatial data set exists for all PSAPs. All these GIS databases are locally developed, and maintained information is bound to a single PSAP or a single 9-1-1 authority.

The intent of geolocating calls is a significant change to how 9-1-1 calls route. Currently, only OSPs control the information and routing about a call. This can lead to misrouting and a loss of data if a call must be transferred outside of an OSP service area. This results in calls losing critical information as they are transferred from OSP to OSP and from PSAP to PSAP.

The significance of routing based upon location cannot be overstated. The benefits of location-based routing in NG9-1-1 allows for 9-1-1 to operate as a seamless system rather than a series of siloes and individual platforms.

4.2.1 Address Databases

One of the primary components of a 9-1-1 call is the determination of caller location. Within a legacy 9-1-1 call flow this is often done through using databases that contain a fixed address and fixed database comprised of addresses, address ranges, boundaries, points, and landmarks.

Legacy databases (e.g. ALI) are often developed from the Service Order Interface (SOI) records. The SOI record is a database record that contains a service order name, address, or where the telephone number is assigned.

If attributes are not present in the databases or is inconsistent, the call will still route to the PSAP because it uses the SRDB that was defined through the SOI process. While SOI records are still utilized, there are other methods of database development such as the Master Street Address Guide (MSAG).

The MSAG is developed and maintained by the 9-1-1 authority (often a county) that contains the address ranges and street names for the county. The MSAG is used as a validation that the ALI database has a corresponding street and address range. This process ensures that a PSAP will receive validated ALI on the screen at the position for each call.

In NG9-1-1, emergency call routing and location validation occurs through the geolocation database system that has been aggregated and normalized through GIS. These functions are defined in NENA i3 Standards as Emergency Call Routing Function (ECRF) and Location Validation Function (LVF). The ECRF and LVF transactions utilize the spatial information provisioned by GIS to route calls through the NG9-1-1 Emergency Services IP Network (ESInet) and present the location information to the PSAP.

4.2.4 GIS Normalization and GIS Synchronization

During transition to NG9-1-1 call routing, databases used in the legacy 9-1-1 system will serve as a baseline to ensure that migration operates in a consistent manner as the current 9-1-1 routing system. Over time, the manner in which the 9-1-1 routing data is managed and maintained will change. Instead of the MSAG process, the data will be managed through GIS which will allow for a more effective and efficient update and correction method.

As transition occurs, there will be areas that may require attention including:

- Disparate GIS management agencies and systems
- Disparate GIS data layers
- Sharing of GIS information
- Inconsistent attribute data
- Reconciliation of GIS data with MSAG
- Normalization of GIS data
- Existing ALI management tools and services

Through the GIS development process, two additional steps will be undertaken by the State or a GIS subcontractor.

First, all GIS data will be “normalized” across the state. This entails:

- GIS normalization of attribute data:
    - Verified through a Quality Assurance/Quality Control step
        - Centerline matches, gaps and overlaps

        - Boundary matches, gaps and overlaps
    - That all edges between counties have been "matched"
        - All edges for all PSAP boundaries are seamless
    - That all gaps and overlaps of GIS features (points, lines, polygons) have been corrected
        - All layers are reviewed to ensure a common structure
    - Data will be merged and available on a greater coverage area than ever before

The second step is GIS Synchronization. This step audits the ALI and MSAG information to synchronize the data to the NENA NG-data model for use at the PSAP. This entails:

- GIS synchronization of attribute data:
    - ALI to Centerline audit
    - MSAG to Centerline audit
    - Address points to ALI audit
    - Boundary audit
    - NENA NG9-1-1 data model audit
        - Ensures all PSAPs are using the same data structure

4.2.5 GIS Survey Findings

Based on the survey data collected, PSAPs throughout Wisconsin rely on local GIS expertise and data management programs to perform the day-to-day maintenance and ensure that all data used for 9-1-1 contains the most accurate information. This operation works very well since the local expertise normally has the best access to the ever-changing data attributes. As new data and features are added to the GIS, it is the responsibility of the local GIS authority to certify that the information meets the quality tolerances accepted in their jurisdiction. Quality Assurance (QA) / Quality Control (QC) performed in this manner leads to GIS data only meeting the local need and not the needs of a potential Statewide GIS platform.

Another challenge with this approach is that GIS management, maintenance procedures, and quality thresholds are often different for each PSAP. Multiple data attributes may exist that have been created by differing processes defined locally or for specific purposes in that locality. Thus, creating a composite dataset from local GIS data for NG9-1-1 requires consistency of attributes and geometry between local datasets.

The primary goal of NG9-1-1 GIS operation is creating the strategic outcomes necessary for establishing a common platform for the PSAPs in Wisconsin. This means that all call routing data is standardized, and workflow processes are handled in the same manner across all PSAPs. In a similar fashion, call dispatch data is also standardized, and workflow processes are consistent across all PSAPs. In a NG9-1-1 call routing platform, all attribute data associated with call routing and the plotting of a location on a map display must be provided in a standard format.

Regardless of this migratory path, the focus is on developing a GIS database solution that can ensure that all location information databases can perform the functions necessary to:

- Validate a caller location
- Identify a route to send the call to within the NG9-1-1 system
- Offer the ability to enhance the data through a database management platform
- Provide the ability to normalize GIS records as necessary

The State surveyed the PSAPs to determine the current status of GIS and mapping for all PSAPs in Wisconsin. The resulting tables reflect the GIS survey information which represents an 80% return rate on the Survey and points out areas for consideration during the conceptual design for GIS support and the subsequent Request for Proposal (RFP).

As shown in the tables on the following pages, the existing PSAP-centric GIS activity represents a robust and functional GIS capability as measured in legacy 9-1-1 terms. GIS activities at the local level have been implemented through various means. Many local systems have relied upon an enterprise system that may utilize multiple agencies to support the GIS management and maintenance process.

While the GIS capabilities are consistent from an implementation standpoint, the spatial information utilized by 9-1-1 is very inconsistent. In most cases, the boundaries, centerlines, and address ranges are not matched with the adjacent county which can cause delay in determining the accurate location of a caller. Counties do not typically share or join the GIS system information with adjacent agencies which can cause each county GIS system to be an island.

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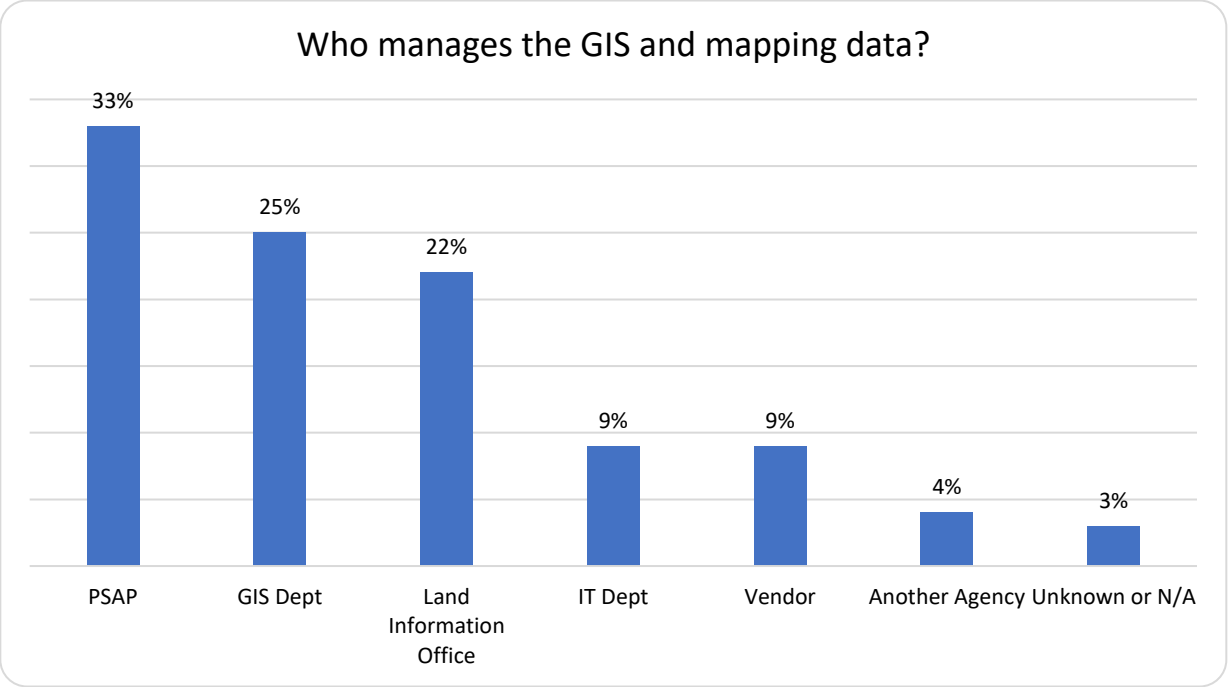
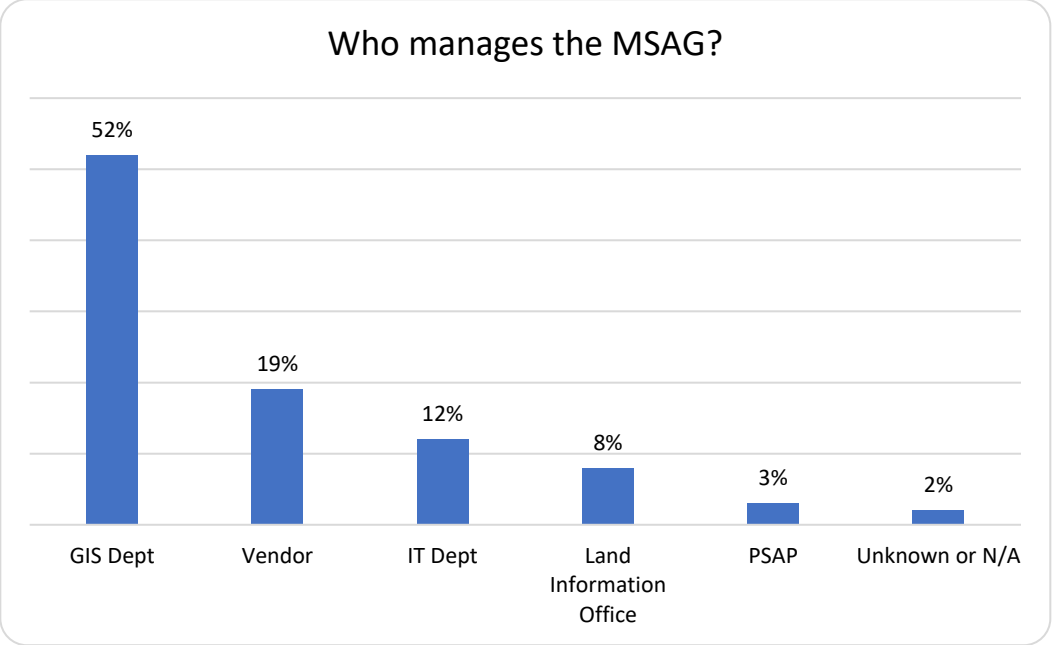
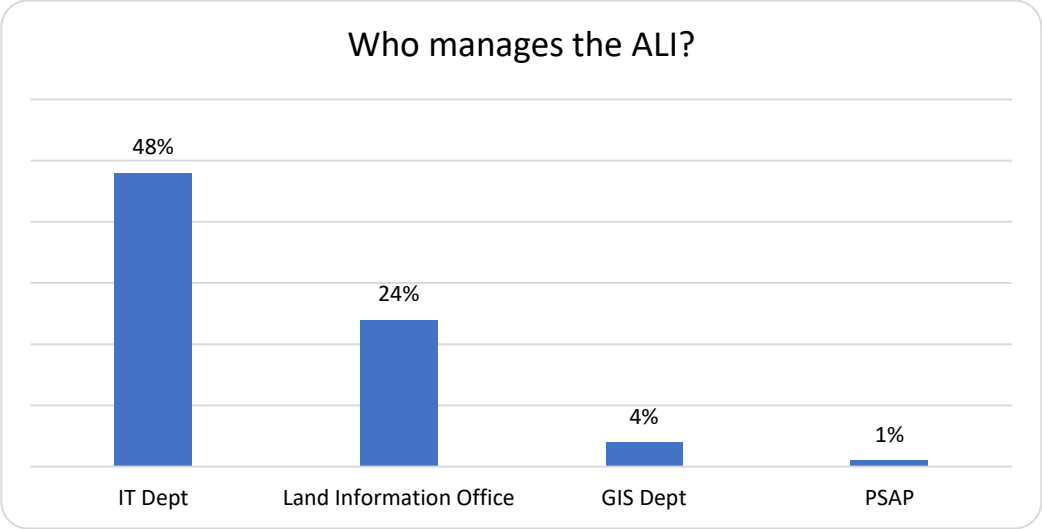

Who manages the GIS and mapping data?
33%
25%
22%
9%
9%
4%
3%
PSAP
GIS Dept
Land Information Office
IT Dept
Vendor
Another Agency
Unknown or N/A


Who manages the MSAG?
52%
19%
12%
8%
3%
2%
GIS Dept
Vendor
IT Dept
Land Information Office
PSAP
Unknown or N/A



As shown with the survey data presented above, the GIS capability utilized at the PSAPs meets the expectations of the legacy 9-1-1 service. The GIS procedures and workflow have been developed to ensure that the affected databases (ALI, MSAG and CAD maps) can all be managed through GIS to some degree. This indicates that the GIS data should be very consistent with the legacy NENA data models.

Additional analysis of the Survey results indicates:

- The existing GIS support that the PSAPs perform today is functionally sound at an individual PSAP level. However, the support for a statewide GIS-based system reflect a gap with consistent regular updates, and the GIS / database content that is used at a particular PSAP.
- While many PSAPs are consistently updating the data, there is a variability in the regularity of updates.
- The involvement of the GIS department or IT department with the workflow is consistent with norms from PSAPs in the United States.
- The data used in the legacy environment will change and additional tools, training, and perhaps personnel will be required.
- The development of a common NG9-1-1 database that is managed by GIS is required to build a common platform for both call routing and call dispatch

4.2.6 Legacy 9-1-1 Call Routing

Existing legacy 9-1-1 systems utilize data that assists in determining the location of a call. 9-1-1 calls are routed to a PSAP based upon the tabular data contained in the SRDB. This data has historically been tied directly to telephone company records that use the fixed address of the structure to link to the telephone number and billing records. It is simply a tabular lookup in the database to find the PSAP associated with a telephone number. Once that information is collected, the Selective Router sends the call on to the PSAP without any

other information. This has worked very well for calls from "fixed" locations (e.g. wireline) and continues to be an efficient way of routing wireline traffic.

This method of call routing and location identification has become obsolete with the introduction and proliferation of wireless and VoIP callers. Caller location is no longer directly tied to a physical location as it was when the legacy 9-1-1 selective routing platform was deployed.

4.2.7 NG9-1-1 Call Routing

In NG9-1-1, civic addresses will utilize frameworks known as Civic Location Data Exchange Format (CLDXF) and the Presence Information Data Format Location Object (PIDF-LO) to replace ALI with location information that must match the data contained in a GIS layer. CLDXF and PIDF-LO offer the potential for more detailed address information than traditional ALI. In a transitional model, all ALI records must be modified to meet the CLDXF framework. GIS is the best option for a tool to do that. CLDXF and PIDF-LO usage is known in NG9-1-1 as "location-by-value".

NG9-1-1 can also route based upon geodetic coordinates, which typically are referred to as X,Y coordinates. Latitude and longitude coordinates are known in NG9-1-1 as "location-by-reference".

While the legacy 9-1-1 call routing platform is obsolete, a lot of the database information that is used currently is relevant for building the NG9-1-1 database used for NG9-1-1 call routing. Typically, this data is reflected as attribute information in a GIS to spatially link a GIS feature with the attribute data that can be used by the NG9-1-1 routing platform. The result is a fully capable and functional location-based system that can link a caller location to the attribute information in the GIS to determine a route.

Examples of the data that can be used to develop a GIS data management structure that are used in legacy 9-1-1 include, but are not limited to:

- Valid MSAG per county
- Selective Routing database information
- County-based Geo-files
- Emergency Service Zones (ESZ) and Emergency Service Numbers (ESN)
- Street Centerlines and Address ranges
- Additional county and regional GIS layers

A simpler way to understand the difference between legacy 9-1-1 call routing and NG9-1-1 call routing is:

E9 1 1 (Legacy)	PSAP "finds" the caller by asking for location
NG9 1 1	Caller "finds" the PSAP by looking for the PSAP location

4.2.7 NG9-1-1 and GIS Strategy

One of the first steps in the development of an NG9-1-1 system is the process of getting the GIS information in order. The NENA NG Data Model has identified the primary (required) layers that are needed to route calls. The remaining layers are useful primarily at a PSAP or jurisdiction to refine the knowledge about a call or situation. Therefore, from a strategic perspective, the layers are often defined in terms of call routing or call dispatch. This is an important designation to consider since many of the call dispatch layers may require additional effort to review, modify, and agree upon.

For the State of Wisconsin, a strategy to build the call routing GIS database with the minimal information to route traffic to a PSAP can allow rapid deployment of NG9-1-1. Once calls are routing to the PSAPs, the funds saved on Selective Routing and other legacy administrative costs may be reapplied to develop the call dispatch data.

4.2.7.1 Call Routing

Call routing is used by the NG9-1-1 system to use the location as the means of routing the call to the correct PSAP. Call routing does not technically require all the information that a call dispatch platform does. However, if the information is available and can be used it is valuable to support and enhance the effectiveness of NG9-1-1.

In almost all cases, call routing via GIS can be introduced sooner in NG9-1-1 implementation and be functioning in a rapid manner. This is due to the call routing function only needing an address and a boundary to select where to route a call. The additional layers and information contained in the NENA Data Model is very important, but if it is not available initially, it does not need to hinder the advancement to NG9-1-1 GIS routing of 9-1-1 traffic.

It is also likely that the call routing GIS data required is already built and will require less initial effort than call dispatch to become deployable with NG9-1-1. Focusing on the call routing data first may accelerate the usage of the ESInet and NG Core Services for routing, rather than waiting until all of the call dispatch data is finished.

4.2.7.2 Call Dispatch

Call dispatch happens after the PSAP receives the call and uses the local tools to display and manage the response to the incident. Call dispatch mapping information is normally used within a local Computer Aided Dispatch (CAD) system and contains specific information that may be useful for a single PSAP. In addition, the call dispatch information contains additional layers that may be used after a call is answered but will not be used to route a call to a PSAP.

The GIS data used for call dispatch is largely influenced by the PSAP. This can require substantial effort to adjust, modify, and match all of the variable data sets from the local level. Layers such as speed limits, road closures,

or other specific files that is important when dispatching a call is not likely to impact routing a call to a PSAP. Feature sets for call dispatch can certainly aid the NG9-1-1 call routing function, but often require concurrence by all agencies. This factor increases the likelihood of substantial delays with strategically deploying a system that can route calls.

This is an important distinction because there are often call dispatch issues (e.g. first response boundaries) that while important are not crucial to develop and implement a geolocation-based call routing platform.

Recommendations

The survey results for GIS are common. However, the results point out the potential for a lack of operational control over a key component for NG9-1-1 if a common GIS data set is not built. In addition, the survey information indicates that a cohesive strategy will allow integration of the GIS systems already being used at the PSAP. Finally, a lack of synergy with respect to the GIS operations (e.g. all perform similar activities for their singular PSAP) can cause a substantial amount of duplication and result in siloed implementations.

As the new NENA Data Model is introduced, this data will need to be normalized with the new format and synchronized between all systems. This step is required to align all PSAPs into a consistent and regular update rhythm as well as create a common data set for all NG9-1-1 traffic.

To accommodate a move into GIS call routing, the following recommendations are presented:

- Establish a GIS subcommittee or workgroup to begin collecting the GIS information available from all PSAPS
- Begin the initial validation of the GIS information for file structure, formatting, and edge-matching
- Establish a GIS data repository where all files can be located
- Evaluate the need for support for Normalization and Synchronization of the GIS, ALI, and MSAG by the State or a contractor

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4.3 Findings and Conclusions

The following list summarizes the findings and conclusions for NG9-1-1 considerations:

- Operating a NG9-1-1 system will lead to better service, reduced costs (after the transition is complete), and improved response at the local level by reducing the need for backup PSAPs, 9-1-1 call transfers, and fast busy call routing scenarios which can all delay response to incidents.

- In some PSAPs, wireless 9-1-1 calls are handled differently than wireline 9-1-1 calls and causes some wireless 9-1-1 calls to be handled twice. NG9-1-1 with dynamic, location-based routing of 9-1-1 calls will eliminate the duplication of work and route 9-1-1 calls to the PSAP that is supposed to answer that 9-1-1 call.

- The ease with which a NG9-1-1 system can dynamically route calls between PSAPs will quickly highlight differences in training and protocols used by PSAPs across the state. The survey results indicate a high level of investment at the local level for both basic telecommunicator and protocol specific training like Emergency Medical Dispatch (EMD). Continued investment in standardized training and protocols with a statewide approach would maximize on the local investments and help provide more uniform service across the state in a NG9-1-1 environment.

- Accurate Geographic Information Systems (GIS) data is vital to the operation of any NG9-1-1 system at both the state and local level. The level of investment in GIS data at the local level in Wisconsin as evidenced by the survey results is outstanding and will be needed as the transition to NG9-1-1 occurs.

- A NG9-1-1 system when combined with accurate GIS data at the local level will eliminate the duplication of work and route wireless 9-1-1 calls to the PSAP that is supposed to answer that 9-1-1 call.

- In order to leverage the investment in GIS at the local level and contribute to the ongoing operation of the NG9-1-1 system, a planned, coordinated NG9-1-1 GIS data sharing process and procedure for all PSAPs will be required.

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Appendix A – Glossary of Terms

For the complete NENA Master Glossary of Terminology (NENA ADM-000.22.2018, 04/13/2018), use the following link: https://cdn.ymaws.com/www.nena.org/resource/resmgr/standards/NENA-ADM-000.22-2018_FINAL_2.pdf

9-1-1: A three-digit telephone number to facilitate the reporting of an emergency requiring response by a public safety agency.

9-1-1 Service Area: The geographic area that has been granted authority by a state or local governmental body to provide 9-1-1 service.

9-1-1 System: The set of network, database, and CPE components required to provide 9-1-1 service.

Access Line: The connection between a customer premises network interface and the Local Exchange Carrier that provides access to the Public Switched Telephone Network (PSTN).

Alternate PSAP: A PSAP designated to receive calls when the primary PSAP is unable to do so.

Automatic Location Identification (ALI): The automatic display at the PSAP of the caller's telephone number, the address/location of the telephone, and supplementary emergency services information.

Automatic Number Identification (ANI): Telephone number associated with the access line from which a call originates.

Backup Public Safety Answering Point (Backup PSAP): Typically, a disaster recovery answering point which serves as a backup to the primary PSAP and is not co-located with the primary PSAP.

Border Control Function (BCF): Provides a secure entry into the ESInet for emergency calls presented to the network. The BCF incorporates firewall, admission control, and may include anchoring of session and media as well as other security mechanisms to prevent accidental, deliberate, or malicious attacks on PSAPs or other entities connected to the ESInet.

Busy Tone: An audible signal indicating a call cannot be completed because the called access line is busy. The tone is applied 60 times per minute.

Call: A session established by signaling with two-way real-time media and involves a human making a request for help or a non-human initiated call. Sometimes it is referred to as a "voice call", "video call" or "text call" when specific media is of primary importance. The term "non-human-initiated call" refers to a one-time notification or series of data exchanges established by signaling with at most one-way media, and typically does not involve a human at the "calling" end. The term "call" may also be used to refer to either a "Voice Call", "Video Call", "Text Call" or "Data–only call", since they are handled the same way through most of Next Generation 9-1-1. It is an element of current and anticipated 9-1-1 payloads.

Call delivery: The capability to route a 9-1-1 call to the designated selective router for ultimate delivery to the designated PSAP for the caller's ANI.

Call Processing: The system and process that permits a PSAP to receive, receive, process, and route a 9-1-1 call and other current and anticipated payloads to a PSAP within the defined environment providing complete payloads with callback and location information of the calling party to the call taker position. Call processing also includes the ability to identify and answer TDD/TT/TTY and abandoned and silent calls including complete and accurate ANI and ALI of the TDD/TT/TTY calls.

Call Transfer: The capability to redirect a call to another party.

Cell: The wireless telecommunications (Cellular or PCS) antenna serving a specific geographic area.

Cell Sector: One face of a cell antenna (typically 3-sided) that operates independently of the other sectors.

Centralized Automated Message Accounting (CAMA): An MF signaling protocol originally designed for billing purposes, capable of transmitting a single telephone number.

Civic Address: Any city-style address that includes a house number and a street name is considered a Civic Address. Civic addresses include a community name that may or may not be recognized by the United States Postal Service or be MSAG valid. Civic addresses may be used as Postal address if recognized by the United States Postal Service. Civic Addresses may be used as MSAG addresses if they are an exact match to the MSAG address. A rural route delivery address or FPO or APO address is not considered a Civic address.

Communication Services: Includes any of the following: (a) the transmission, conveyance or routing of real-time, two-way voice communications to a point or between or among points by or through any electronic, radio, satellite, cable, optical, microwave, wireline, wireless or other medium or method, regardless of the protocol used; (b) the ability to provide two-way voice communication on the public switched network; (c) wireless enhanced 9-1-1 service; (d) wireline enhanced 9-1-1 service; (e) interconnected VoIP provider service as defined by the regulations of the FCC regulations; (f) IP -enabled service; or (g) prepaid wireless service.

Communication Service Provider: An entity that provides communication services to a subscriber or end user.

Computer Aided Dispatch (CAD): A computer-based system which aids PSAP attendants by automating selected dispatching and record keeping activities.

Consolidated PSAP: A facility where one or more Public Safety Agencies choose to operate as a single 9-1-1 entity.

Customer Premises Equipment (CPE): Also known as call handling equipment (CHE) at a PSAP.

Cutover: The activation of a new telephone call processing or switching system.

Database: An organized collection of information, typically stored in computer systems, comprised of fields, records (data) and indexes. In 9-1-1, such data bases include MSAG, telephone number/ESN, and telephone customer records.

Dedicated Trunk: A telephone circuit used for a single purpose, such as transmission of 9-1-1 calls.

Emergency Call: A telephone request for public safety agency emergency services which requires immediate action to save a life, to report a fire, or to stop a crime. This may include other situations as determined locally.

Emergency Call Routing Function (ECRF): A functional element in an ESInet which is a LoST protocol server where location information (either civic address or geo-coordinates) and a Service URN serve as input to a mapping function that returns a URI used to route an emergency call toward the appropriate PSAP for the caller's location or towards a responder agency.

Emergency Services Internet Protocol Network (ESInet): A managed IP network that is used for emergency services communications, and which can be shared by all public safety agencies. It provides the IP transport infrastructure upon which independent application platforms and core functional processes can be deployed including, but not restricted to, those necessary for providing Next Generation 9-1-1 services. ESInets may be constructed from a mix of dedicated and shared facilities. ESInets may be interconnected at local, regional, state, federal, national, and international levels to form an IP-based inter-network (network of networks).

Emergency Service Number (ESN)/ Emergency Service Zone (ESZ): An ESN is a three to five digit number representing a unique combination of emergency service agencies (Law Enforcement, Fire, and Emergency Medical Service) designated to serve a specific range of addresses within a particular geographical area, or Emergency Service Zone (ESZ). The ESN facilitates selective routing and selective transfer, if required, to the appropriate PSAP and the dispatching of the proper service agency (s).

Enhanced 9-1-1 (E9-1-1): An emergency telephone system which includes network switching, database and CPE elements capable of providing Selective Routing, Selective Transfer, Fixed Transfer, ANI and ALI.

Enhanced 9-1-1 Service: A service consisting of communication network, database and equipment features provided for subscribers or end users of communication services enabling such subscribers or end users to reach a PSAP by dialing the digits 9-1-1, or by other means approved by the department, that directs calls to appropriate PSAPs based on selective routing and provides the capability for automatic number identification and automatic location identification.

Enhanced 9-1-1 Service Provider: Any entity that provides 1 or more of the following 9-1-1 elements: network, database or PSAP customer premises equipment.

Enhanced 9-1-1 Systems: A distinct entity or geographical segment in which enhanced 9-1-1 service is provided, consisting of network routing elements serving as a control office and trunking connecting all central offices within a geographical segment, and including PSAPs and network used to deliver location data to PSAPs from a data base.

Exchange: A defined area, served by one or more telephone central offices, within which a Local Exchange Carrier furnishes service.

Fast Busy: See Reorder Tone.

FCC: Federal Communications Commission.

Fixed Transfer: The capability of a PSAP attendant to transfer a 9-1-1 call to a pre-determined location by activating a single button.

Functional Element: Major process, application or appliance, including network bandwidth and bandwidth support.

Geographic Information Systems (GIS): A computer software system that enables one to visualize geographic aspects of a body of data. It contains the ability to translate implicit geographic data (such as a civic address) into an explicit map location. It has the ability to query and analyze data in order to receive the results in the form of a map. It also can be used to graphically display coordinates on a map i.e., latitude/longitude from a wireless 9-1-1 call.

Interoperability: The capability for disparate systems to work together.

IP-enabled Service: A service, device or application which makes use of Internet Protocol (IP) and is capable of entering the digits 9-1-1, or by other means as approved by the department, for the purposes of interconnecting users to the enhanced 9-1-1 systems including, but not limited to, voice over IP and other services, devices, or applications provided through or using wireline, cable, wireless, or satellite facilities or any other facility that may be provided in the future.

Legacy Network: A 9-1-1 network that is operating as a basic or enhanced 9-1-1 system and/or the existing analog-based enhanced 9-1-1 systems in the State of Wisconsin.

Legacy Network Gateway (LNG): A signaling and media interconnection appliance between analog callers in legacy wirelines/wireless originating networks and an i3 architecture so that PSAPs are able to receive emergency calls from such legacy networks.

Legacy PSAP: A PSAP that cannot process calls received via i3-defined call interfaces (IP-based calls) and still requires the use of CAMA or ISDN trunk technology for delivery of 9-1-1 emergency calls.

Legacy PSAP Gateway (LPG): An i3 functional element that supports the interconnection of the ESInet with legacy PSAPs.

Legacy Selective Router Gateway (LSRG): This gateway facilitates the routing/transfer of emergency calls between the ESInet and the legacy emergency services network. The LSRG will have to interwork location infrastructure between Next Generation 9-1-1 and legacy emergency services environments.

Local Exchange Carrier (LEC): A Telecommunications Carrier (TC) under the state/local Public Utilities Act that provides local exchange telecommunications services. Also known as Incumbent Local Exchange Carriers (ILECs), Alternate Local Exchange Carriers (ALECs), Competitive Local Exchange Carriers (CLECs), Competitive Access Providers (CAPs), Certified Local Exchange Carriers (CLECs), and Local Service Providers (LSPs).

Location Information Server (LIS): A functional element that provides locations of endpoints. A LIS can provide Location-by-Reference, or Location-by-Value, and, if the latter, in geo or civic forms. A LIS can be queried for the location of an endpoint. In either case, the LIS receives a unique identifier that represents the endpoint, for example an IP address, circuit-ID or MAC address, and returns the location (value or reference) associated with that identifier. The LIS also provides the dereferencing service, exchanging a location reference for a location value.

Location to Service Translation (LoST) Protocol: A protocol that takes location information and a Service URN and returns a URI, is used generally for location-based call routing and, in Next Generation 9-1-1, is used as the protocol for the ECRF and LVF.

Location Validation: Refers to the action of ensuring that a civic address can be used to discern a route to a PSAP.

Location Validation Function (LVF): Function that provides sufficient location-based information to a PSAP that allows a 9-1-1 call taker to dispatch emergency responders to a 9-1-1 call scene. The location information is provided by civic based addresses or latitude/longitude data.

Logging Recorder: A voice-band audio recorder which records to and plays from a permanent storage media such as tape or disk. Logging recorders are typically multi-channel so as to simultaneously record from several sources.

Master Street Address Guide (MSAG): A data base of street names and house number ranges within their associated communities defining Emergency Service Zones (ESZs) and their associated Emergency Service Numbers (ESNs) to enable proper routing of 9-1-1 calls.

National Emergency Number Association (NENA): The National Emergency Number Association is a not-for-profit corporation established in 1982 to further the goal of "One Nation-One Number." NENA is a networking source and promotes research, planning and training. NENA strives to educate, set standards and provide certification programs, legislative representation, and technical assistance for implementing and managing 9-1-1 systems.

NENA i3 Standards or i3: NENA Next Generation 9-1-1 standards and requirements, including without limitation, the NENA Security for Next Generation 9-1-1 Standard and the NENA i3 Technical Requirements Documents, now available or as may become available in the future.

Network Components: Any software or hardware for a control switch, other switch modification, trunking or any components of a computer storage system or database used for selective routing of 9-1-1 calls, automatic number identification and automatic location identification, including a PSAP.

NextGen Core Services: The base set of services needed to process a 9-1-1 call on an ESInet. This includes the ESRP, ECRF, LVF, BCF, Bridge, Policy Store, Logging Services and typical IP services such as DNS and DHCP. The term NG9-1-1 Core Services includes the services and not the network on which they operate.

Next Generation 9-1-1 (NG9-1-1): An enhanced 9-1-1 system that incorporates the handling of all 9-1-1 calls and messages, including those using IP-enabled services or other advanced communications technologies in the infrastructure of the 9-1-1 system itself.

Non-Session Initialized (NSI): A mobile device for which there is no valid service contract with any provider. As such, NSI devices have no associated subscriber number and address, do not provide a call-back number, and may not provide location.

Overflow: The process of automatically rerouting calls to an alternate facility.

Payload: Any multi-media that presents to the network as a call, request for emergency assistance, or an equivalent, including without limitation, real-time communication and non-real time communication, voice, text, video, images, alerts, alarms, graphics, or telematics.

Primary PSAP: A PSAP equipped with automatic number identification and automatic location identification displays and is the first point of reception of a 9-1-1 call (see PSAP).

Private Branch Exchange (PBX): A private telephone system that is connected to the Public Switched Telephone Network.

Public Safety Answering Point (PSAP): A facility equipped and staffed to receive 9-1-1 calls. A Primary PSAP receives the calls directly. If the call is relayed or transferred, the next receiving PSAP is designated a Secondary PSAP.

Public Switched Telephone Network (PSTN): The network of equipment, lines, and controls assembled to establish communication paths between calling and called parties in North America.

Quality Assurance (QA)/Quality Control (QC): Quality assurance is the maintenance of data at a required level of quality through each step or process of preparation. Quality control is the system of maintaining standards during the development of data.

Redundancy: Duplication of components, running in parallel, to increase reliability.

Reorder Tone: An audible tone of 120 interrupts per minute (ipm) returned to the calling party to indicate the call cannot be processed through the network. Sometimes referred to as fast busy.

Secondary PSAP: A PSAP to which 9-1-1 calls are transferred from a Primary PSAP (see PSAP).

Selective Routing (SR): The routing of a 9-1-1 call to the proper PSAP based upon the location of the caller. Selective routing is controlled by the ESN which is derived from the customer location.

Selective Routing Data Base (SRDB): The routing table that contains telephone number to ESN relationships which determines the routing of 9-1-1 calls.

Selective Transfer: The capability to transfer a 9-1-1 call to a response agency by operation of one of several buttons typically designated as police, fire, and emergency medical; based on the ESN of the caller.

Service Provider: An entity providing one or more of the following 9-1-1 elements: network, CPE, or database service.

Spatial: Relating to, occupying, or having the character or space. Geographical information systems store spatial data in regional databases.

State 9-1-1 Office: An organization that operates on a statewide basis to coordinate the implementation and operation of 9-1-1 services. The responsibilities and level of authority of a State 9-1-1 Office vary across the nation and usually include administrative oversight, grant administration, and some rule-making authority. Wisconsin's equivalent to a State 9-1-1 Office is the Department of Military Affairs' Office of Emergency Communications.

System Service Provider (SSP): The entity acting as the prime 9-1-1 service provider for all calls and traffic throughout the state.

Telecommunicator: As used in 9-1-1, a person who is trained and employed in public safety telecommunications. The term applies to call takers, dispatchers, radio operators, data terminal operators or any combination of such functions in a PSAP.

Teletypewriter (TTY): Also known as TDD. A device capable of information interchange between compatible units using a dial up or private-line telephone network connections as the transmission medium. ASCII or Baudot codes are used by these units (per EIA PN-1663).

Transfer: A feature which allows the PSAP Telecommunicator to redirect a 9-1-1 call to another location.

Trunk: Typically, a communication path between central office switches, or between the 9-1-1 Control Office and the PSAP.

Voice over Internet Protocol (VoIP): A type of IP-enabled service that allows for the two-way real time transmission of voice communications and has access to the public switched network.

Wireless Enhanced 9-1-1 Service: The service required to be provided by wireless carriers under, and governed by, FCC order.

Wireless Telecommunications: The family of Telecommunications services under the heading of Commercial Mobile Radio Service. This includes Cellular, Personal Communications Services (PCS), Mobile Satellite Services (MSS) and Enhanced Specialized Mobile Radio (ESMR).

Wireline Carrier: An incumbent local exchange carrier or local exchange carrier operating in the commonwealth, or a telephone company, or any other person, corporation or entity that provides local exchange service.

Wireline Enhanced 9-1-1 Service: Service provided by a wireline carrier that connects a subscriber dialing or entering the digits 9-1-1 to a PSAP.

Appendix B – WI PSAP Survey 2019

WI-NG - 911 PSAP Assessment Survey

1. 911 Agency Information

The Wisconsin 9-1-1 Subcommittee is responsible for implementing a statewide Next Generation 9-1-1 (NG9-1-1) system. One of the statutory duties of Wisconsin's 9-1-1 Subcommittee, as outlined in Wis. Stat. 256.35(3s)(d), is to conduct a statewide 9-1-1 telecommunications system assessment.

Goals of the statewide 9-1-1 system assessment are to:

- **Determine the status of Wisconsin Public Safety Answering Points (PSAPs) relative to NG9-1-1 readiness and capability.**
- **Develop a complete and accurate list of Wisconsin's primary and secondary PSAPs.**
- **Identify pending actions or projects that may impact or be impacted by the implementation of NG9-1-1 in Wisconsin.**
- **Identify statutory and regulatory impacts (local, state, and federal) related to the implementation of NG9-1-1and identify the federal, state, and local authorities, agencies, and governing bodies whose participation and cooperation will be needed to implement NG9-1-1 in Wisconsin.**
- **Identify current and potential funding sources (local, state, and federal) for implementing a statewide ESInet and NG9-1-1 services.**
- **Identify potential costs to state and local stakeholders of implementing NG9-1-1 in Wisconsin.**
- **Identify any other issues related to the implementation of NG9-1-1 service, including requirements set forth in Wis. Stat. 256.35(3s).**
- **Assess current 9-1-1 network capability.**
- **Identify existing broadband and telephony infrastructure and upgrades needed to implement the NG9-1-1 network, including but not limited to trunks, routers, bandwidth capacity, and wireless tower infrastructure.**
- **Identify current equipment and software, as well as changes needed to implement the ESInet at the state and PSAP levels, including but not limited to CPE, servers, workstations, ANI/ALI controllers, GIS, CAD, mapping, and RMS.**
- **Identify existing and necessary upgrades or solutions to GIS/mapping data to implement NG9-1-1 and identify any changes to the Master Street Address Guide (MSAG) required for NG9-1-1 and how geocoding would integrate in the routing of NG9-1-1.**
- **Identify current and possible future end-user services and applications that will need to**

interface with both the current and future NG9-1-1 networks, such as text messaging.

There are an estimated 109 primary PSAPs in Wisconsin and an unknown number of secondary PSAPs.

Timeline: The Survey will be conducted in February and March 2019, with follow up and verification taking place in April and May 2019. The survey results will be used for the PSAP Assessment Report, which is expected to be submitted to the 9-1-1 Subcommittee, the Interoperability Council, and the Adjutant General of the Department of Military Affairs for review and approval in June 2019.

The PSAP Assessment Report will be completed prior to the procurement of an ESInet or other NG9-1-1-related services in Wisconsin.

The purpose of this survey is to gather information from every primary and secondary PSAP in the state that is required to complete the statewide 9-1-1 telecommunications system assessment.

This survey is designed to take approximately 30 - 60 minutes. If you are not able to complete the survey in one sitting, your answers and information will be saved, and you will be able to pick up where you left off. Please complete the survey by March 1, 2019

1. PSAP Information

PSAP Name

Site Address

City/Town

State/Province

ZIP/Postal Code

2. PSAP Director/Manager

Name

Title

Email Address

Phone Number

3. Is your PSAP a division of another agency (i.e. Sheriff's office or County Agency)?

- ◯ Yes
- ◯ No

4. Other Agency Information (If same as above, skip to Question 5)

Agency Name	
Address	
City/Town	
State/Province	
ZIP/Postal Code	
Agency CEO (Chief, Sheriff)	
Phone Number	

WI-NG - 911 PSAP Assessment Survey

2. PSAP Demographics

5. Number of Agencies Served by your PSAP

Police/Law Enforcement	
Fire	
EMS	
Other	

6. Is your PSAP the only PSAP in your jurisdiction?

- ◯ Yes
- ◯ No

If no, please provide the names of the other PSAP or PSAPs

7. Do you transfer 9-1-1 calls to another PSAP for Dispatching?

- ◯ Yes
- ◯ No

If yes, please list other PSAPs you transfer 9-1-1 calls to.

8. Does another PSAP transfer 9-1-1 calls to you for Dispatching?

- ◯ Yes
- ◯ No

If yes, please list PSAPs that transfer 9-1-1 calls to your PSAP

9. What geographic area is covered by your PSAP? (e.g., county of, city of, etc.)

10. PSAP Staffing Information (filled/open)

# Administrative Staff (Manager) (filled/open)	
# Supervisors (filled/open)	
# Telecommunicators (filled/open)	
# Support personnel (IT, radio tech, etc) (filled/open)	
# Total (filled/open)	

11. Do your Telecommunicators work in multiple roles while on duty? (e.g., jail officer, clerical, permits, etc.)

- ◯ Yes
- ◯ No

Please describe

12. Shift Staffing (minimum # of staff, if 12's - enter Morning and Night)

Morning Shift	
Afternoon Shift	
Night Shift	

13. Staff Training - Does your PSAP Require any basic training?

	Yes / No
Basic Telecommunicator (e.g. 40 hour APCO or equivalent)	

List any other basic training or continued education your PSAP requires

14. Staff Training - Does your PSAP Require any of the following Dispatch Protocol training?

	Yes / No
Law Enforcement Formal Protocols	
Fire Dispatch Formal Protocols	
Emergency Medical Dispatch Formal Protocols	

List any other protocol training your PSAP requires

WI-NG - 911 PSAP Assessment Survey

3. Annual PSAP Call Statistics

15. Annual Number of 9-1-1 Calls by Call Type (list all known)

Wireline Calls	
Wireless Calls (including non-service initialized)	
VoIP Calls	
9-1-1 call Transfers to other agencies	
Abandoned	
Total	

Text Services

16. Does your PSAP accept Text to 9-1-1?

- ◯ Yes
- ◯ No

Comments

17. What method do you use?

- [ ] Browser
- [ ] TTY
- [ ] IP/MSRP

Browser type (e.g. Gem)

18. Annual Number of Text to 9-1-1 sessions

Administrative Call Statistics

19. Annual Number of Administrative, non-9-1-1 calls

Backup PSAP

20. In the case of call overflow during heavy call volume, do your 9-1-1 calls route to another PSAP?

If Yes, please provide name of PSAP. If No, please explain what happens to those calls or callers.

21. Does your PSAP maintain a physical backup PSAP location?

- ( ) Yes
- ( ) No

If yes, please provide address information here

22. Does another PSAP serve as your backup?

- ◯ Yes
- ◯ No

If yes, who

23. Do you serve as a backup for another PSAP?

- ◯ Yes
- ◯ No

If yes, who

24. Do you have BadgerNet located in your equipment room or available at your PSAP?

- ◯ Yes
- ◯ No

Comments

WI-NG - 911 PSAP Assessment Survey

4. PSAP Technology

25. Customer Premise Equipment (9-1-1 call answering equipment)

Manufacturer (e.g. Vesta,. Positron, Solacom)

Model & Version (e.g. Vesta Pallas or Positron Viper)

Purchase/Installation Date

Who provides maintenance/support for your equipment (e.g. Phone company, radio shop, manufacturer)

26. Who is your 9-1-1 network service provider?

27. Did you purchase or lease your CPE?

- ◯ Purchase - Hosted / Cloud Based
- ◯ Purchase - Onsite
- ◯ Lease
- ◯ Comments

28. Regardless of what the state is doing, do you have any current plans to replace or upgrade your CPE in the next 12 - 24 months?

- ◯ Yes
- ◯ No

If yes, how will the replacement / upgrade be funded?

29. Number of 9-1-1 Trunks/Lines (please include soon-to-be additions)

# of 9-1-1 trunks	

30. How many 9-1-1 answering positions (i.e., workstations) does your PSAP have?

Active / Primary	
Backup	
Training	

31. 9-1-1 Call Recorder

Vendor	
Manufacturer	
Version	
SIP (Session Initiation Protocol) Capable (yes or no)	
Installation Date	
Date of last update	

32. Administrative Phone System

Vendor	
Manufacturer	
Version	
Installation Date	
Date of last update	

33. Master Clock

Vendor	
Manufacturer	
Version	
Installation Date	
Date of last update	

34. Computer Aided Dispatch (CAD)

Vendor	
Version	
Date of Installation	
Date of last update	

35. Mapping

Vendor	
Version	
Date of Installation	
Date of last update	

36. How is CAD mapping maintained?

- [ ] Internal
- [ ] External

If contracted externally provide contact info

Budget

37. How is your PSAP funded?

38. Please list annual costs for the following

CPE Maintenance	
ANI/ALI Database charges	
9-1-1 Trunks/Lines	
Software Licensing	
Database & Network	
CAD Maintenance	
Software Licensing	
Radio Maintenance	
Hardware Purchases	
Personnel (expense salary, benefits)	

39. How does your PSAP presently use GIS? (e.g., GIS updates CAD map, ALI / MSAG management, Other)

40. How often is the GIS data updated?

- ◯ Daily
- ◯ Weekly
- ◯ Monthly
- ◯ Quarterly
- ◯ As needed

Comments

41. When was the last GIS update implemented?
(e.g. enter date or comment)

42. What layers are presently available in the GIS files?

- [ ] Streets
- [ ] Boundaries (PSAP boundary, Emergency Service Boundary, Other)
- [ ] Points (Cell towers, Critical points)
- [ ] Landmarks (Parks, Recreation areas)

Comments

43. Who manages your PSAP's GIS data for 9-1-1 ? (e.g., PSAP staff, another agency, outside vendor)

44. Who manages your MSAG? (e.g., PSAP staff, another agency, outside vendor)

45. Who manages your ALI? (e.g., PSAP staff, another agency, outside vendor)

46. Any major 9-1-1 System changes planned in the next 12 - 24 Months?

Other (please specify)

47. Any Other Questions or Comments