



MissionCriticalPartners
Because the Mission Matters

Next Generation 911 Readiness Assessment

Report

PREPARED DECEMBER 2021 FOR
THE STATE OF MISSOURI

[MissionCriticalPartners.com](https://www.MissionCriticalPartners.com)

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Executive Summary

The Missouri 911 Service Board (Board) is a governor-appointed board established in statute to assist and advise the State of Missouri (State) in ensuring the availability, implementation, and enhancement of a statewide emergency telephone number. The Board is responsible for assisting the State in all jurisdictions through research, planning, training, and education.

Formerly the Advisory Committee for 911 Service Oversight, the Board's composition and responsibilities were updated in 2017 through legislation ([Senate Bill 503](#)), modifying the representative organizations (i.e., Board members) and expanding Board responsibilities. 2018 legislation ([House Bill 1456](#)) further expanded the Board's responsibilities in improving Missouri's 911 system in the most efficient and cost-effective manner possible.

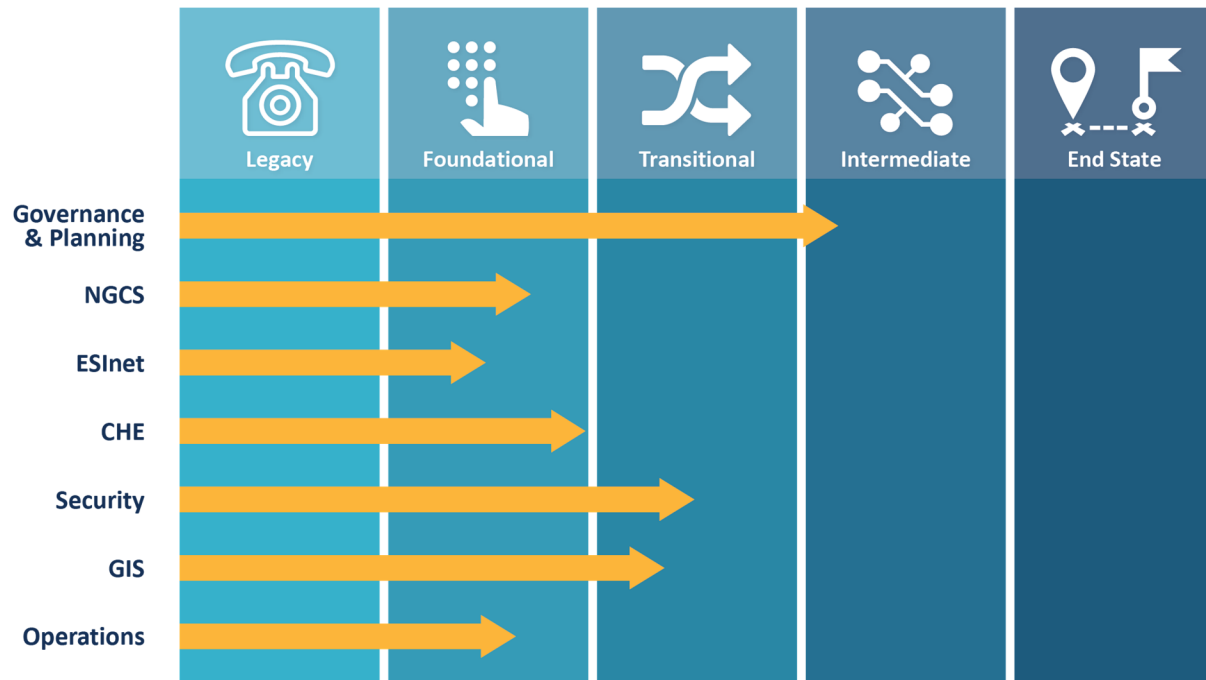
The Board's executive director is the designated point of contact for Federal 911 initiatives and coordinates the Board's mandate to pursue Federal funding and ensure all requirements are fulfilled to maximize this and other funding opportunities.

The Board is embarking on a transition to Next Generation 911 (NG911) and, in 2021, enlisted the assistance of Mission Critical Partners, LLC (MCP) to conduct an NG911 readiness assessment.

At the heart of the assessment were stakeholder interviews conducted using MCP's proprietary Model for Advancing Public SafetySM (MAPS[®]) tool. The MAPS tool helped provide insight into where Missouri 911 (MO911) is today and where it needs to be for a successful transition to NG911. Using criteria based on national standards, industry benchmarks, and best practices, feedback from Board staff and the Missouri public safety answering point (PSAP) community was translated into easy-to-understand scores and a heat map diagram, which can be used to build an NG911 strategic roadmap specific to Missouri.

Each initiative within this MAPS assessment will help set the course for the Board's evolution toward NG911 readiness. One can imagine NG911 readiness as a continuum from 1 to 10. The MAPS assessment assigned MO911 an overall score of 4.11. This indicates that Missouri is in a transitional stage where the migration to NG911 has begun in some geographic and technical areas. This level of readiness indicates that some technology is already in place and that Missouri is beginning to take the steps towards planning and implementing NG911.

The graphic below illustrates where MO911 is on the continuum in the following categories: Governance, NG911 Core Services (NGCS), Emergency Services Internet Protocol (IP) network (ESInet), Call-Handling Equipment (CHE), Security, Geographic Information System (GIS), and Operations.



1 Background

In 2017, pursuant to the Revised Statutes of Missouri (RSMo) 650.325, the Board was updated, and its responsibilities expanded. Changes in 2018 further expanded the Board's responsibilities in improving Missouri's 911 system in the most efficient and cost-effective manner possible.

The Board consists of 15 members representing various stakeholder interests of 911. The members are appointed by the Governor. The Board "*... is charged with assisting and advising the state in ensuring the availability, implementation and enhancement of a statewide emergency telephone number common to all jurisdictions through research, planning, training and education ...¹*".

Currently, the Board has six vacancies, representing the following:

- Governor's Council on Disability
- Municipalities
- Wireless telecommunications service providers
- Telecommunications service providers
- Voice over IP (VoIP) service providers
- Association representing interests related to 911

An executive director oversees the Board's coordination and is supported by a contracted third-party company that also provides administrative support to the Board.

2 Approach and Methods

To holistically understand Missouri's readiness for NG911, MCP reviewed data collected by the Board to better understand the 911 landscape across all jurisdictions.

MCP conducted interviews with key staff members using its proprietary MAPS tool to assess MO911's readiness for an NG911 environment. Recognizing that the transition from legacy 911 is significant and goes beyond technology replacement, MCP's MAPS process focuses on understanding the current operational processes, staffing, governance (policies, procedures, and by-laws), funding models, and technical networking and architecture.

The MAPS tool includes customized questions that are grouped into topic-specific categories based on best practices and industry standards developed by organizations and workgroups such as the Federal Communications Commission's (FCC) Task Force on Optimal Public Safety Answering Point (PSAP) Architecture (TFOPA), the National Institute of Standards and Technology (NIST), the National Emergency Number Association (NENA), and the Association of Public-Safety Communications Officials (APCO) International.

¹ <https://www.missouri911.org/statutes>

Board staff members were asked more than 70 conversational questions regarding seven NG911 readiness categories, shown below. Additional interviews of Board members, PSAP directors, and others within the Missouri 911 community were completed for greater insights regarding 911 in Missouri. The responses to the questions and additional information were scored, and the resulting heat map (refer to Section 3) provides a high-level view of the areas where prioritized focus is warranted.

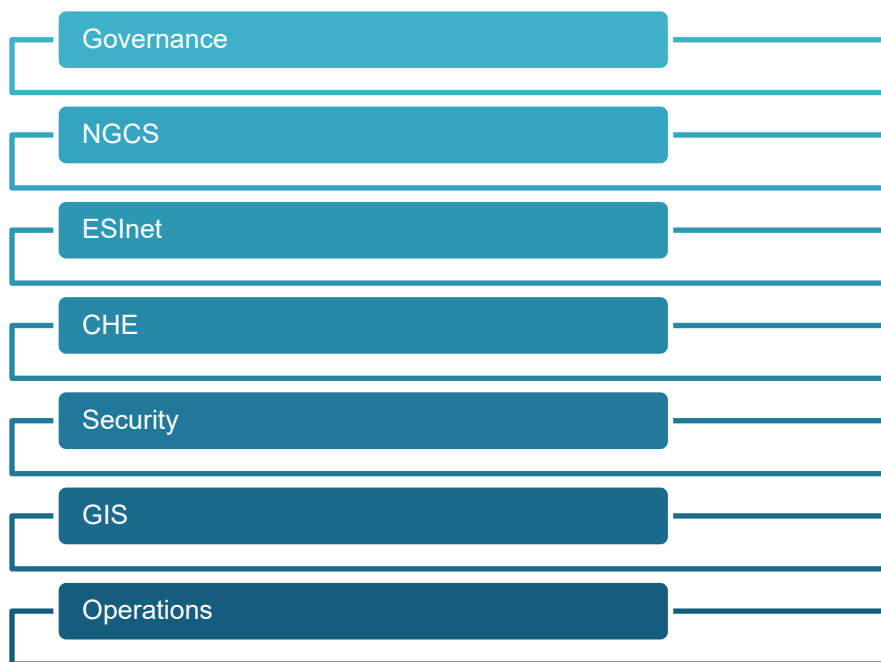


Figure 1: NG911 Readiness Categories

3 Current State

If one imagines NG911 readiness as a continuum from 1 to 10, where a rating of “1” represents “foundational,” “5” represents “transitional,” and “10” represents “NG911 ready,” the MAPS assessment assigned MO911 an overall score of **4.11**, as shown in the table below. This indicates that Missouri is in the initial transitional state of readiness for NG911 as the agency and some PSAPs have taken the beginning steps for the transition to NG911. This level of readiness is very common in the early stages of preparation and reflects strongly on an organization that is forward-focused and keen to identify gaps. There are still areas of improvement to be made before jumping headlong into the technical and operational waters of NG911. Notably, there were some areas in which Missouri is deeper into the transitional process than in others. In those areas, the goal would be to continue and maintain the good work and keep progressing to NG911 readiness.

MAPS NG911 Readiness Assessment

Missouri 911

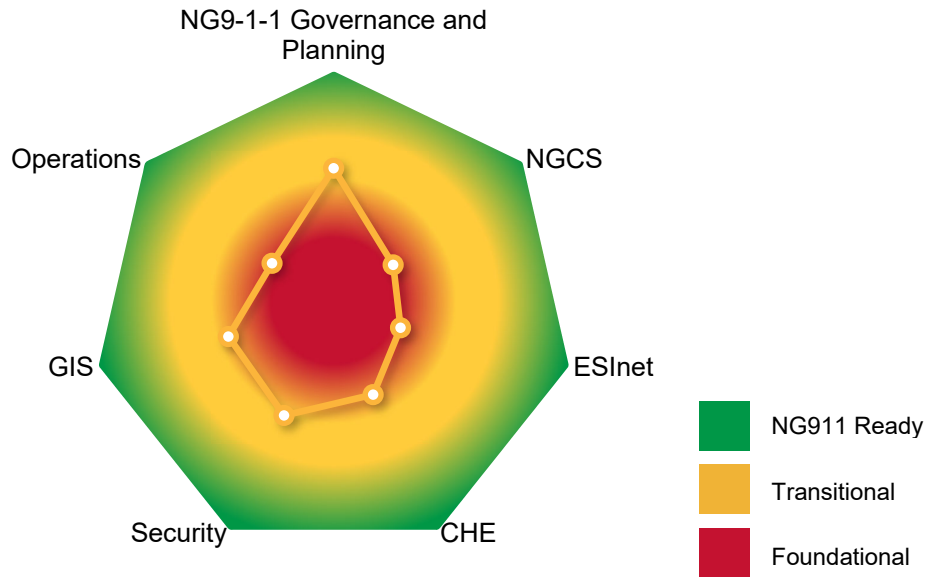


Figure 2: MAPS Readiness Assessment

Table 1: NG911 Readiness Scores

Lever	Overall Score	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8	Question 9	Question 10
Governance	6.10	8.00	4.00	5.00	4.00	7.00	7.00	7.00	4.00	9.00	6.00
NGCS	3.22	5.00	3.00	4.00	3.00	4.00	3.00	2.00	3.00	2.00	
ESInet	2.90	4.00	2.00	3.00	2.00	2.00	4.00	3.00	4.00	2.00	3.00
CHE	3.86	5.00	6.00	4.00	2.00	4.00	2.00	4.00			
Security	4.83	4.00	4.00	4.00	6.00	5.00	6.00				
GIS	4.57	3.00	6.00	4.00	5.00	2.00	5.00	7.00			
Operations	3.33	2.00	4.00	6.00	2.00	2.00	4.00				
Overall Score	4.11										

3.1 Governance

Today's emergency communications environment is complex, and as new emergency communications technology is deployed, it will require even more planning and discussion between Board staff, PSAPs, technology and service providers, and emergency responders. A robust governance structure fosters stakeholder-engaged decision-making. It provides an opportunity for cross-jurisdictional and cross-functional discussions to take place—discussions that are essential for interoperable, functional, and operational success.

A strong governance structure is critical in the transition from legacy 911 to NG911 because the transition impacts every aspect of 911—from network technology changes outside the walls of the PSAP to the hardware and software used within the PSAP, including PSAP operations. It is critical that goals, objectives, tasks, and timelines, as well as impacts to the PSAP, are carefully communicated throughout the process. Every stakeholder must be aware of, and involved in, the transition process. Communication among MO911 staff and stakeholders is key to this transition.

[TFOPA](#) was created to provide a framework for readiness and maturation of the NG911 transition model from foundational to end-state NENA i3 (i.e., NG911). The MAPS assessment overlays the TFOPA framework, as well as industry standards and best practices, to develop a baseline from which to plan and coordinate transition strategies and procure technologies to improve NG911 readiness.

The MAPS tool examines ten key areas associated with or requiring governance to help assess NG911 readiness.

- Documentation
- Strategic Planning
- Communication
- Coordination
- Technology
- Budgeting
- Funding
- Staffing
- Procurement
- Standards and Best Practices

Based on the MAPS assessment, a review of the documentation provided, and interviews with MO911 staff, MO911 achieved an overall score of **6.10** for governance—a transitional state on the NG911 readiness continuum.

MAPS NG911 Readiness Assessment

Missouri 911

NG9-1-1 Governance and Planning



Table 2: Governance Readiness Scores

Lever	Overall Score	Documentation	Strategic Planning	Communication	Coordination	Technology	Budgeting	Funding	Staffing	Procurement	Standards and Best Practices
Governance	6.10	8.00	4.00	5.00	4.00	7.00	7.00	7.00	4.00	9.00	6.00

3.1.1 Documentation

Rating: 8.00

The Board has detailed rules and regulations that outline the Board’s purpose and duties. Overall, the Board is charged with:

... taking immediate steps toward improving access to 911 emergency services² to protect Missouri residents in emergency situations, particularly in underserved areas of the state.

... required to set percentage rates of the prepaid wireless emergency telephone service charges deposited in the Missouri 911 service trust fund to reimburse 911 services authority for costs incurred to implement and operate Missouri 911 systems and for answering and dispatching emergency calls.

... establish and administer a grant and loan program to provide financing from the Missouri 911 service trust fund for costs of implementing 911 communications service projects.³

In addition, the Board “*is charged with assisting and advising the state in ensuring the availability, implementation and enhancement of a statewide emergency telephone number common to all jurisdictions through research, planning, training, and education, but shall have no authority over communications service providers.*”⁴

In addition, the Board has detailed by-laws covering membership, conflicts of interest, ethics, and administrative details of Board meetings and records.⁵

Documentation includes references to the *NENA Detailed Functional and Interface Standards for the NENA i3 Solution* (NENA-STA-010.2-2016)⁶ and defines Next Generation 911” or “NG9-1-1” as “*a system comprised of managed IP-based networks, gateways, functional elements and databases that augment or replicate present day E9-1-1 features and functions and provide new capabilities. NG9-1-1 is designed to provide access to emergency services from all sources, and to provide multimedia data capabilities for PSAPs and other emergency service organizations.*”⁷

3.1.2 Strategic Planning

Rating: 4.00

The Board does not have a strategic plan. Board staff identified that this is a crucial element missing from Board operations and are beginning to develop a strategic plan that addresses NG911. The Board will use

² Access to emergency services includes the availability of text-to-911

³ Title 11 Department of Public Safety, Division 90 Missouri 911 Service Board, Chapter 1 Board Operations, 11 CSR 90-1.010 Overview. [v45n12a.pdf \(squarespace.com\)](https://www.squarespace.com/v45n12a.pdf)

⁴ RSMo 650.325 Missouri 911 service board established. <https://revisor.mo.gov/main/OneSection.aspx?section=650.325>

⁵ State of Missouri. By-laws: Missouri 911 Service Board https://static1.squarespace.com/static/5dd41599eefcb7babf27472/t/5f5fd5d6b48880567f7e6c76/1600116183465/Amended-ByLaws+Missouri+911+Service+Board_8_20DOCX.pdf

⁶ There is a newer version ([NENA-STA-010.3a-2021](https://www.nena.org/standards/010.3a-2021)). The referenced version can be found here: [NENA-STA-010.2 \(ymaws.com\)](https://www.ymaws.com/NENA-STA-010.2).

⁷ Title 11 Department of Public Safety, Division 90 – Missouri 911 Service Board, Chapter 2 911 Financial Assistance Program, 11 CSR 90-2.010 Definitions (N). <https://static1.squarespace.com/static/5dd41599eefcb7babf27472/t/5ef650780ba9554bdc401e19/1593200765180/v45n12a.pdf>

the findings from this MAPS assessment to assist in developing its road map for the next three to five years.

3.1.3 Communication

Rating: 5.00

While the Board does not have a formal communications plan, it has accomplished a lot in the last 18 months and has established a path to provide regular updates consistently. In addition to a quarterly newsletter to PSAPs, Board representatives regularly present to Missouri professional public safety organizations (i.e., NENA, APCO, and State 911 Directors).

The Board meets monthly. The Board's objective is to provide representation for all 911 stakeholders.

The Board hosts regional in-person/virtual meetings quarterly. These meetings provide Board staff the ability to keep stakeholders abreast of Board activities, as well as hear from the stakeholder community. Board staff attend and present at the Missouri Public Safety Communications Conferences (MPSCC).

The Board's website is up to date and contains accessible information on meeting dates and times, agendas, and minutes.

3.1.4 Coordination

Rating: 4.00

MO911 has begun preliminary talks with neighboring states as staff and PSAPs recognize that state boundaries are a complex issue. The Board recognizes the complexities of coordinating with eight adjacent states while understanding that multiple solutions are viable to ensure interstate connectivity solutions that are currently unavailable in the legacy 911 system.

As the Board moves towards NG911, coordination with neighboring states and ESInet and NGCS providers will be needed.

3.1.5 Technology

Rating: 7.00

An NG911 stakeholder group comprised of representatives from the 911 community with both operational and technical expertise has been established.

Technical planning is a charge of the Board. The technical minimums required for NG911 (and E911) are not laid out or discussed in detail but are acknowledged as an aspect that needs to be included.

3.1.6 Budgeting

Rating: 7.00

The Board funds its current operational costs within its allocated budget and is fully transparent with the 911 community on financial issues. Board staff have a small budget to fund their minimal expenses and have kept overhead expenditures below 6% annually.

Budgeting is focused on the implementation of 911 services where it does not exist, ensuring texting abilities to 911 services, implementation of an ESInet for public safety agencies, and several other key initiatives identified within legislation.

3.1.7 Funding

Rating: 7.00

Missouri counties and the City of St. Louis⁸ can collect 911 funds in several manners, including a landline levy, sales tax, or all device methods. Local 911 fees are collected by each jurisdiction, which can set its own rates and collection method within limits set by Missouri legislation. Each county may decide how to fund its 911 services.⁹

Locally, 911 fees have traditionally been placed on landline phones (including VoIP) but cannot be levied upon prepaid wireless service by local jurisdictions. Missouri statute outlines that the prepaid wireless 911 fee rates, collection, and disbursement method are the responsibility of MO911.

The revenue generated by local and prepaid 911 fees does not cover all local 911 expenses. Many jurisdictions must provide additional funds through general fund contributions and other methods to support 911 services, which may result in disparities of service. Funding will be needed not just for NG911 implementation but ensuring current 911 systems are maintained through the transition period.

“The board is required to set percentage rates of the prepaid wireless emergency telephone service charges deposited in the Missouri 911 service trust fund to reimburse 911 services authority for costs incurred to implement and operate Missouri 911 systems and for answering and dispatching emergency calls.”¹⁰

The Board has authority to *“set the percentage rate of the prepaid wireless emergency telephone service charges to be remitted to a county or city is provided under subdivision (5) of subsection 3 of section 190.460.”¹¹*

⁸ County Funding Options, Missouri 911 Service Board. <https://www.missouri911.org/county-funding-options>

⁹ Ibid.

¹⁰ Title 11 Department of Public Safety, Division 90 Missouri 911 Service Board, Chapter 1 Board Operations, 11 CSR 90-1.010 Overview.

<https://static1.squarespace.com/static/5dd41599eefcb7babf27472/t/5ef650780ba9554bdc401e19/1593200765180/v45n12a.pdf>

¹¹ Authorizing Statute, Missouri 911 Service Board. 650.330 4.(18). <https://www.missouri911.org/statutes>

3.1.8 Staffing

Rating: 4.00

The Board's executive director is directly employed by the Board. The Board augments all administrative staff services through a third party. This staffing will need to expand as MO911 progresses towards NG911 to support the administration and monitoring of NG911 services and/or support the distribution of future federal grant funds specified for the State 911 Board administration.

In support of the Board's goals of migrating to NG911, staff or staff services with specific NG911/911 technical and/or GIS expertise will be needed to migrate, implement, and support Missouri's NG911 system.

3.1.9 Procurement

Rating: 9.00

The Board has an independent procurement process that has been used to solicit professional services. The ability to purchase specific NG911 hardware, software, and related products is not fully documented (to date) but is well within the Board's authority and operational capabilities.

3.1.10 Standards and Best Practices

Rating: 6.00

The Board has the authority to provide recommendations to both primary and secondary PSAPs regarding technical and operational standards for 911 service¹² as well as establish criteria for consolidation prioritization of PSAPs.

Today, the Board conducts an annual PSAP survey to evaluate the potential for improved services and coordination. The survey forms the basis for the Board to complete the National 911 Program's annual survey requested of each state's designated 911 point of contact.

3.2 Next Generation 911 Core Services

NGCS are the functional elements responsible for NG911 call-routing capabilities. The NENA i3 standard for these functional elements is defined in [NENA-STA-010.2-2016](#), *NENA Detailed Functional and Interface Standards for the NENA i3 Solution* (as well as its successor and related documents). Given the often-transitional nature of NG911 routing solution implementations, it is common for agencies to have some or all routing technologies in place for the transition to NG911 while still integrated with legacy call-

¹² Ibid. 650.330 4. (2)

routing elements. The result is a broad spectrum of readiness ranging from foundational to end-state NG911.

The MAPS tool examines nine key areas associated with NGCS to help assess NG911 readiness.

- | | |
|--|---|
| <ul style="list-style-type: none">• Technology Procurement• Functional Elements• Routing Solutions• Automatic Location Identification (ALI) Database Management System (DBMS) and Location Information Services (LIS) | <ul style="list-style-type: none">• Service Level Agreements (SLAs)• Reporting and Management Information Systems (MIS)• Interoperability• Call Transfer Capabilities• Additional Data Repositories (ADR) |
|--|---|

Based on the MAPS assessment, a review of the documentation provided, and interviews with Board staff, MO911 achieved an overall score of **3.22** for NGCS—a foundational state on the NG911 readiness continuum.

The foundational rating for this portion of the assessment highlights an opportunity to acquire a statewide, standards-based solution that supports the long-term operational needs of the State and its PSAPs. By defining a statewide set of baseline requirements and capabilities for this critical infrastructure, the Board has a tremendous opportunity to raise the bar and level the playing field for all PSAPs and all users across Missouri.

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MAPS NG911 Readiness Assessment

Missouri 911

NGCS

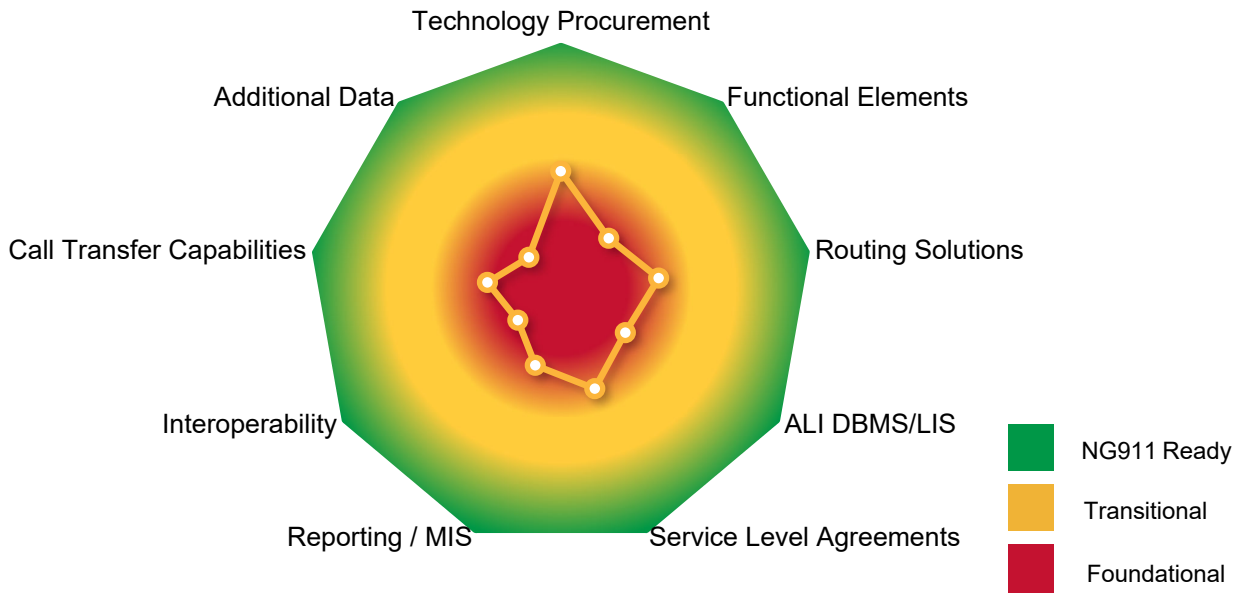


Figure 4: NGCS MAPS

Table 3: NGCS Readiness Scores

Lever	Overall Score	Technology Procurement	Functional Elements	Routing Solutions	ALI DBMS and LIS	SLAs	Reporting and MIS	Interoperability	Call Transfer Capabilities	ADR
NGCS	3.22	5.00	3.00	4.00	3.00	4.00	3.00	2.00	3.00	2.00

3.2.1 Technology Procurement

Rating: 5.00

MO911 is conducting an NG911 needs assessment. The Board has created an NG911 committee. However, no requirements for NGCS have been identified at this time.

3.2.2 Functional Elements

Rating: 3.00

While PSAPs are at various levels of deploying NG911 technology and the functional elements associated with NGCS implementation, currently, there is no coordinated effort to deploy NGCS across the state.

3.2.3 Routing Solutions

Rating: 4.00

Based on [NENA 03-002](#), *NENA Standard for the Implementation of Enhanced MF Signaling, E9-1-1 Tandem to PSAP*; [NENA 03-005](#), *NENA Standard Generic Requirements for an Enhanced 9-1-1 Selective Routing Switch* (archived); and [NENA-STA-010.2-2016](#), the current routing technologies used by PSAPs in Missouri are rated as foundational. This is because PSAPs within the state are currently supported by legacy 911 solutions provided by the local exchange carriers (LECs) and 911 system service providers.

3.2.4 ALI DBMS and LIS

Rating: 3.00

PSAPs within the state are currently all supported by legacy 911 solutions. The functional elements required for NG911 include a Location Validation Function (LVF) and LIS in the end-state i3 solution. PSAPs will likely need to implement a transitional solution for a period before these functional elements are in production usage. A transitional solution should support both legacy and i3 data needs and is commonly referred to as a location database (LDB).

3.2.5 SLAs

Rating: 4.00

Service level agreements (SLAs) are a vital tool in holding solution and service providers accountable to their contractual commitments. Currently, such performance criteria are largely developed at the local level and are dependent on the solution a PSAP has in place. 911 in Missouri is operated by legacy solution providers and supported through legacy agreements for services through incumbent LECs. These disparities can lead to different service levels in each jurisdiction. However, procuring a statewide NG911 system or setting minimum standards for Board-funded NG911 solutions with a common set of service-level requirements could substantially improve each PSAP's ability to dictate and enforce the terms of any SLA.

3.2.6 Reporting and MIS

Rating: 3.00

Annually, PSAPs are required to self-report call volume to the Board. The Board has no insight into the performance or activity within the call-routing infrastructure. For example, there is no data to show if a 911 call was delivered to a PSAP or if there were any issues affecting how long call delivery takes. It could benefit Missouri to implement a statewide reporting or MIS program to automate the collection of data. This would support the Board in its charge of ensuring the availability of 911.

3.2.7 Interoperability

Rating: 2.00

Inter-tandem transfer capabilities in legacy 911 solutions are often limited to local access and transport area (LATA) boundaries and/or interoperating agreements with LECs. In many cases, the LECs do not employ systems that can support the full functionality of E911 in a transfer scenario. Currently, Missouri is rated as legacy.

3.2.8 Call Transfer Capabilities

Rating: 3.00

Local PSAPs can transfer 911 calls through the legacy selective router for ANI¹³/ALI within the limitations of their local exchange provider and 911 system service provider coverage area. This is the minimum expected service level in the legacy 911 environment.

3.2.9 ADR

Rating: 2.00

In the current 911 environment, there is limited functionality for integrated additional data repositories (ADR). Access to these solutions is through third-party connectivity and/or out-of-band network connections at the local PSAP CHE level; however, PSAPs are only beginning to leverage these resources.

3.3 Emergency Services IP Network

Per [NENA-INF-016.2-2018](#), *Emergency Services IP Network Design (ESIND) Information Document*, an “ESInet is a specialized IP network designed and implemented ... to allow connectivity between public safety agencies. ESInets lay the groundwork for NG9-1-1 configurations by providing the common routed

¹³ Automatic number identification

infrastructure to deliver critical information. ESInets provide transport, interoperability, security, and related services.”¹⁴

Given the transitional nature of some ESInet implementations, it is common for agencies to have ESInet facilities in place to support NG911-ready CHE and other IP-based mission-critical network services. The level of redundancy in ESInet implementations across the country varies widely, representing the full range of categories from foundational (single point-to-point connections between sites) to fully redundant, resilient, and highly secure rings and mesh networks (end state).

MO911 recognizes the ESInet of the future is meant to be a wholly separate network solution—designed and implemented for the purpose of supporting NGCS—and may be implemented in tandem with i3-compliant call-handling solutions, i3-compliant radio networks, or other IP-based and data-driven public safety network projects. These design decisions will be addressed at a future date and incorporated into the NG911 procurement requirements.

The MAPS tool examines ten key areas associated with the current state of networking infrastructure among public safety agencies in the state to help assess NG911 readiness.

- | | |
|--|--|
| <ul style="list-style-type: none">• Carrier Ingress• Interconnectivity• Survivability• Monitoring• Change Management | <ul style="list-style-type: none">• Reporting and MIS• Bandwidth• Nclock¹⁵• Quality of Service (QoS)• Documentation |
|--|--|

Based on the MAPS assessment, a review of the documentation provided by the PSAPs, and interviews with Board staff and 911 stakeholders, MO911 achieved an overall score of **2.90** for the ESInet—a foundational state on the NG911 readiness continuum. This was anticipated given the lack of ESInet deployments across the state.

¹⁴ *Emergency Services IP Network Design (ESIND) Information Document*, NENA-INF-016.2-2018. National Emergency Number Association, April 5, 2018, section 2.1.

¹⁵ Network clock

MAPS NG911 Readiness Assessment

Missouri 911

ESInet

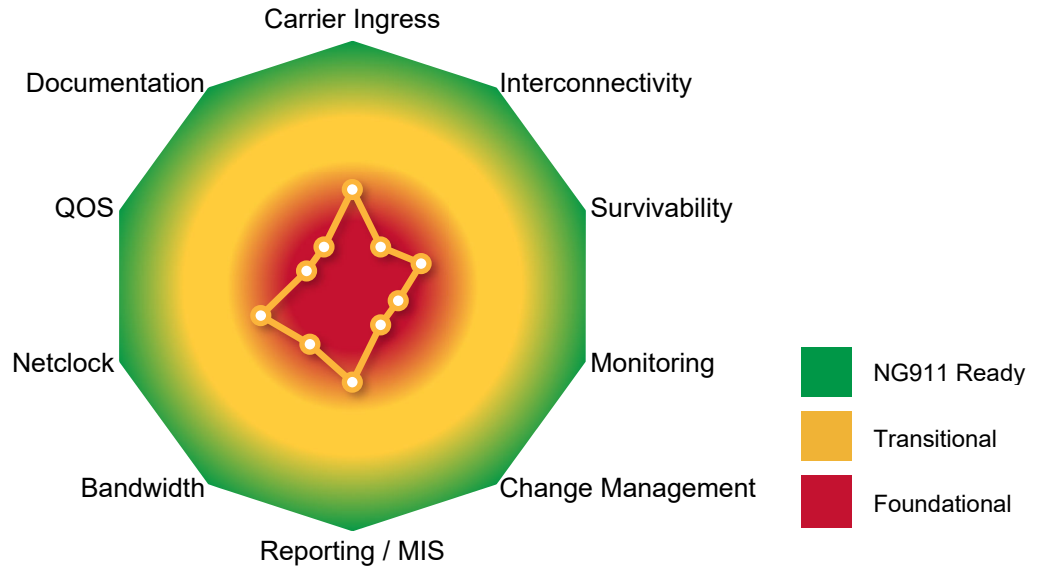


Figure 5: ESInet MAPS

Table 4: ESInet Readiness Scores

Lever	Overall Score	Carrier Ingress	Interconnectivity	Survivability	Monitoring	Change Management	Reporting and MIS	Bandwidth	Netclock	QoS	Documentation
ESInet	2.90	4.00	2.00	3.00	2.00	2.00	4.00	3.00	4.00	2.00	3.00

3.3.1 Carrier Ingress

Rating: 4.00

Currently, all PSAPs are supported by legacy centralized automatic message accounting (CAMA) circuits for 911 call delivery. Although some jurisdictions are developing non-CAMA solutions and have procured solutions to migrate to IP-based solutions, at the time of this report, implementation of a non-CAMA system has not been completed.

3.3.2 Interconnectivity with Neighboring ESNets

Rating: 2.00

Missouri does not currently have interconnectivity with neighboring ESNets. The Board has recognized that this is a challenge, especially between states, as in some areas, different LECs and state boards have made transferring 911 data almost impossible. The Board seeks to improve upon this and desires to use a standards-based approach to ensure interoperability between ESNets.

3.3.3 Survivability

Rating: 3.00

The implementation of CHE host/remote solutions and other IP-based services to individual PSAPs has increased and created diverse connections to PSAPs. However, many locations are sustaining traditional single-path services instead of requiring geographic diverse, multipath builds for network access. A handful of PSAPs have developed geodiverse, ring-style networks for data centers and/or critical PSAP facilities, but these are limited to the more urban areas with many carrier options.

3.3.4 Monitoring

Rating: 2.00

As noted, there is a lack of visibility into the health and performance of the current call delivery infrastructure. PSAP metrics are self-reported to MO911 annually. The data-based nature of an ESNets naturally lends itself to more transparency and visibility.

3.3.5 Change Management

Rating: 2.00

Each PSAP is responsible for establishing change management policies with its respective LEC. There is no common methodology to coordinate changes across the state.

3.3.6 Reporting and MIS

Rating: 4.00

There is no requirement or formal agreement for 911 system service providers and LECs to provide health and performance reports to the Board or local PSAPs. The Board would have to request these reports from each PSAP or service provider in the current environment.

3.3.7 Bandwidth

Rating: 3.00

Currently, all PSAPs are supported through CAMA or CAMA-like connections to deliver 911 calls, which are sized at one trunk per call path. Typically, these legacy circuits have very low capacity (64 kilobits per second [kbps] per trunk) and very basic data-carrying capability (usually limited to ANI only). By comparison, the IP circuits specified in i3 can be built with a broad spectrum of bandwidth and can deliver a practically unlimited variety of data types and formats. This flexibility (in capacity and capability) makes such circuits virtually future proof, as they may be reconfigured and resized relatively easily as ESInet requirements evolve.

3.3.8 Netclock

Rating: 4.00

To reconcile timestamped log data from disparate elements in a network-based infrastructure, it is critical that all elements reference a common timing source. Taking time signals from the global positioning system (GPS) satellite constellation is an easy and cost-effective way to synchronize systems separated by vast distances. Furthermore, a GPS time reference is widely considered to be legally defensible if records are to be used in court.

GPS satellites are considered Stratum 0 (essentially the original source). As devices receive GPS signals and forward them to other devices, each hop in that chain increases the stratum number, indicating a potential loss in traceability, reliability, and accuracy. In public safety, it is considered best practice to have every physical facility where system elements are housed have its own Stratum 1-time source, meaning an onsite netclock that receives signals directly from the GPS network via a GPS antenna connected directly to the netclock.

Since there is no common network in the state, MO911 must rely upon timestamps provided by the LECs, system service providers, and CHE vendors. There is no best practice guideline or requirement that PSAPs use time signals from a GPS satellite constellation. Netclock decisions are made locally.

3.3.9 QoS

Rating: 2.00

QoS is a mechanism for defining and enforcing relative priorities between different types of data traversing the same network. In an ESInet QoS scheme, the packetized voice traffic for 911 “calls” is generally considered to be of the highest priority for delivery, as compared to the exchange of inter-agency emails or even updated GIS data, for example.

QoS rules not only mark different packets based on their priority but also enforce those priorities by delaying or even dropping lower-priority data, when and if necessary, to ensure the timely delivery of higher-priority data. A QoS scheme based on industry best practices can greatly improve the perceived

quality of the voice (also known as the Mean Opinion Score [MOS] for VoIP), leading to clearer communication and understanding between all parties on the call. QoS only applies to call delivery (prioritization and signal quality) over data networks, which the PSAPs do not employ today. MO911 will need to provide clear requirements in this area for any NG911 procurement.

3.3.10 Documentation

Rating: 3.00

The Board does not have records or network diagrams of the 911 infrastructures currently used to process 911 voice and/or data traffic within the state. Some individual PSAPs working directly with network providers have access to limited infrastructure documentation, although it is inconsistent statewide.

Moving to an i3 ESInet will make it easier to develop a common operating picture of the 911 environment. The required documentation should be available to individual PSAPs or regional authorities, at a minimum. Furthermore, the requirements for the procurement of NG911 solutions may be written to include the delivery and regular updates of such documentation.

3.4 Call-Handling Equipment

CHE is a key component in the NG911 environment. Analog technologies are rapidly becoming a thing of the past as the nation's major telephone carriers migrate away from copper-line networks. This key component of 911 call delivery can be a stumbling block for many jurisdictions financially, technologically, and/or operationally when implementing NG911. Older analog technology may not be capable of processing the available features of an NG911 call, thus eliminating much of the information that may be available to a telecommunicator.

Given the cyclic nature of hardware refreshes, it is common for states to have a mix of call-handling capabilities in place, ranging from foundational to regional end-state NG911.

The MAPS tool examines seven key areas associated with call-handling to help assess NG911 readiness.

- | | |
|--|---|
| <ul style="list-style-type: none">• i3-capable Call Handling• Text-to-911• Text-from-911• Logging and Recording | <ul style="list-style-type: none">• Mapping• MIS• ADR |
|--|---|

Based on the MAPS assessment, a review of the documentation provided, and interviews with Board staff and the PSAP community, MO911 achieved an overall score of **3.86** for the CHE—a transitional state on the NG911 readiness continuum.

MAPS NG911 Readiness Assessment

Missouri 911

Call-Handling Equipment

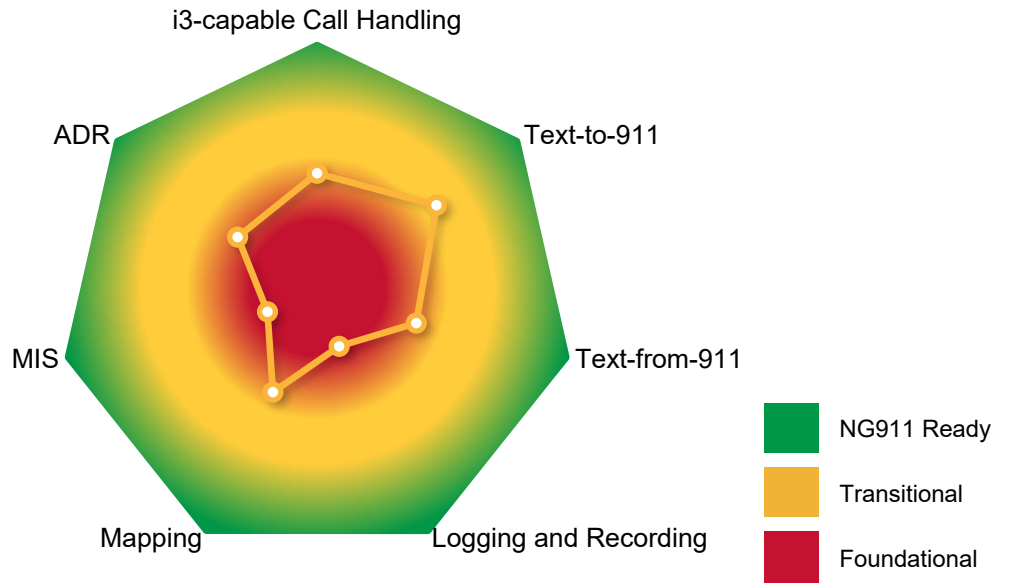


Figure 6: CHE MAPS

Table 5: CHE Readiness Scores

Lever	Overall Score	i3-capable Call Handling	Text-to-911	Text-from-911	Logging and Recording	Mapping	MIS	ADR
CHE	3.86	5.00	6.00	4.00	2.00	4.00	2.00	4.00

3.4.1 i3-capable Call Handling

Rating: 5.00

Based on information collected from the annual PSAP survey, 47% of PSAPs (52) report that their CHE equipment is NG911-compliant, and there are no requirements outside of the grant guidelines that

equipment should be NG911-compatible¹⁶. MO911 will need to closely monitor the deployment of i3-capable CHE to ensure that when NG911 is deployed PSAPs will be able to operate.

3.4.2 Text-to-911

Rating: 6.00

The Board is charged with ensuring that disabled residents have access to text-to-911 services.¹⁷ Forty-six percent of PSAPs (51) report that they have received a text message.

The Board provides grant funding to support deploying text-to-911, which it defines “*as the ability to send a text message to reach 911 emergency call takers from a mobile phone or device.*”¹⁸ The grant rules do not specify how text-to-911 should be deployed (i.e., integrated into CHE or an over-the-top solution), only that grant funding is available; localities make the decision.

3.4.3 Text-from-911

Rating: 4.00

Text-from-911 is a useful tool within a PSAP, but there are no national standards or best practices associated with this service. Text-from-911 allows non-verbal communications initiated by the PSAP to re-engage callers and/or validate abandoned calls. Many PSAPs within Missouri have implemented this service directly or via third-party providers with success. Text-from-911 is not reliant upon operational text-to-911 service to operate. This service should not be a substitute for providing text-to-911.

3.4.4 Logging and Recording

Rating: 2.00

There are no requirements that PSAPs have logging recorders. Logging recorders can qualify as equipment that can be funded via the grant guidelines. In the 2020 PSAP survey, 44% of PSAPs (49) reported that they had upgraded their logging recorder to be NG911-compatible. Fifteen PSAPs reported that they share recording equipment with another PSAP.

Absent basic i3 compliance, legacy recording solutions that are in place may be unable to capture even basic (now IP-based) audio from i3 CHE, much less the rich metadata as well as short message service (SMS), multimedia, and other content that the i3 specification defines.

¹⁶ Missouri 911 Service Board's Financial Assistance Program. *Description and Application Instruction*. <https://static1.squarespace.com/static/5dd41599eefcb7babf27472/t/5fbc26dc4a08301495c899d9/1606166236423/Application+Description+and+Instructions+Winter+2020.pdf>

¹⁷ Authorizing Statute, Missouri 911 Service Board. <https://www.missouri911.org/statutes>

¹⁸ Missouri 911 Service Board's Financial Assistance Program. *Description and Application Instruction*. <https://static1.squarespace.com/static/5dd41599eefcb7babf27472/t/5fbc26dc4a08301495c899d9/1606166236423/Application+Description+and+Instructions+Winter+2020.pdf>

3.4.5 Mapping

Rating: 4.00

Missouri has taken the initial steps in analyzing the availability and viability of GIS data within the state that is related to the database requirements within an NG911 solution. As such, almost all PSAPs have provided GIS and master street address guide (MSAG) data samples to the Board's selected reviewer, who is developing a gap analysis and future needs assessment.

The GIS gap analysis will identify the PSAPs that have met or are moving towards GIS-compliant datasets while also locating locations that need supplemental support and assistance.

The Board has adopted GIS standards for data formats based on NENA i3 requirements but has not extended these to guidelines for PSAP mapping solutions that support needed i3 functionality such as zooming, depicting circles of uncertainty, and imagery. Statewide coordination of this effort is progressing. Locally though, PSAPs admit that due to a lack of resources, they sometimes struggle to keep data current and updated.

3.4.6 MIS

Rating: 2.00

All call volume is self-reported annually as part of the Board's PSAP survey, which is required for each grant awardee. Localities are requested to break out call metrics to measure the number of wireless, VoIP, and landline 911 calls received. Various platforms are used, and there is no requirement that equipment is to be ready to capture i3 log events.

3.4.7 ADR

Rating: 4.00

When data is made available to telecommunicators early and throughout the 911 call, situational awareness improves—which can result in quicker and more appropriate emergency response. The concept of additional data was introduced in the second version of the NENA i3 standard ([NENA-STA-010.2-2016](#)). Since the concept was announced, the industry has seen incremental and important steps being made to provide more data to telecommunicators during requests for emergency assistance. This data, in most cases, is provided through over-the-top (OTT) or out-of-band solutions that leverage queries directly from the call-handling solution to provide access to additional data, when available, for a call.

A majority of PSAPs (74) use OTT solutions (e.g., RapidSOS) to receive supplemental location data.

3.5 Security

Cybersecurity is of great importance for all broadband-enabled devices and networks. NG911 systems, particularly the ESInet, are no different and, in fact, command greater importance regarding cybersecurity.

The number of cyberattacks already perpetrated against corporations and public safety entities the world over is staggering; with each passing year, the number of these attacks continues to grow, as does the severity of the attacks.¹⁹

Public safety agencies are encouraged to follow both TFOPA and NIST standards and recommendations as a framework to build a successful cybersecurity management process.

The NIST [Cybersecurity Framework](#) provides a framework and methodology for improving and protecting the public safety infrastructure from cyberthreats. The framework suggests a five-phase approach to cybersecurity preparedness:

1. Identify—develop an organizational understanding of how to identify cybersecurity risks
2. Protect—develop and implement appropriate safeguards to protect against known and unknown threats
3. Detect—develop and implement activities to detect a cybersecurity event if protection fails
4. Respond—develop and implement activities to mitigate a detected cybersecurity incident
5. Recover—develop and implement plans for restoring services due to an incident

TFOPA's [NG9-1-1 Readiness Scorecard](#), Section 4.4, *Security*, identifies six comprehensive steps for creating a cybersecurity plan that complements the NIST phases:

1. Identification/Discovery—inventory all existing systems and applications
2. Assess/Prioritize—conduct risk assessments and establish security controls
3. Implement/Operate—document policies, procedures, and controls and administer security controls
4. Monitor and Evaluate—monitor and examine operational environments
5. Test/Evaluate—audit and verify findings
6. Improve/Evolve—reassess and reevaluate policies, procedures, and security controls²⁰

As noted earlier, the MAPS assessment relies on the TFOPA framework, as well as NIST and other standards, to develop a baseline from which to plan and coordinate transition strategies and operational effectiveness to improve security for NG911 readiness. The MAPS tool examines six key areas associated with security to help assess NG911 readiness.

- | | |
|--|---|
| <ul style="list-style-type: none">• Cybersecurity Plan/Policy• Proactive Monitoring• Risk Assessment | <ul style="list-style-type: none">• Network Security• Physical Security• Staff Security |
|--|---|

Based on the MAPS assessment, a review of the documentation provided, and interviews with Board staff and local stakeholders, MO911 achieved an overall score of **4.83** for security—a transitional state on the NG911 readiness continuum.

¹⁹ “110 Must-Know Cybersecurity Statistics for 2020.” Varonis. <https://www.varonis.com/blog/cybersecurity-statistics/>

²⁰ [TFOPA WG2 Supplemental Report-120216.pdf \(fcc.gov\)](#)

MAPS NG911 Readiness Assessment

Missouri 911

Security

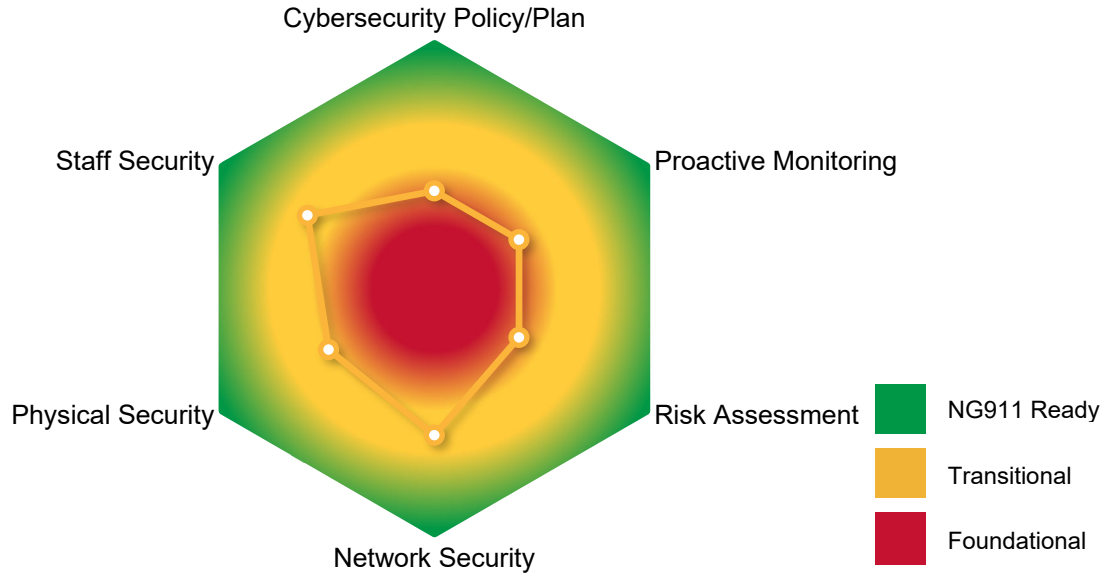


Figure 7: Security MAPS

Table 6: Security Readiness Scores

Lever	Overall Score	Cybersecurity Plan/Policy	Proactive Monitoring	Risk Assessment	Network Security	Physical Security	Staff Security
Security	4.83	4.00	4.00	4.00	6.00	5.00	6.00

3.5.1 Cybersecurity Plan/Policy

Rating: 4.00

MO911 is guided by State policy for cybersecurity. There are no connections between MO911 and localities—other than the National Crime Information Center (NCIC). Localities manage their networks. While one-third of PSAPs report that they have undertaken some type of cybersecurity planning, there are no specific requirements on what those plans entail. This leaves two-thirds of the PSAPs more vulnerable to cybersecurity attacks. While there is no way to 100% safeguard systems, cybersecurity assessments and planning can reduce the risk.

There is no overarching entity responsible for a state plan to include individual PSAPs. The Board recognizes the need for cybersecurity and has stated a desire to ensure that cybersecurity policies and best practices are adopted as part of future NG911 component implementations. Currently, the Board directly supports cybersecurity educational and awareness initiatives for PSAPs and individual telecommunicators.

3.5.2 Proactive Monitoring

Rating: 4.00

Today, there are PSAPs operating in both legacy and regionalized ESInet environments. Legacy systems do not provide MO911 the ability to proactively monitor the system. And while an ESInet environment does, there is no statewide coordinated effort to monitor for cyberthreats.

3.5.3 Risk Assessment

Rating: 4.00

Each locality is responsible for conducting and performing risk assessments. Some PSAPs have conducted risk and vulnerability assessments. The Board has a vested interest in cybersecurity planning and has awarded grant funds for such initiatives, but the State has not set local cybersecurity policies or requirements.

3.5.4 Network Security

Rating: 6.00

Current MO911 information technology (IT) is managed by the Missouri Information Technology Services Division (ITSD). For equipment and NG911 solutions, the Board should require the service provider to be NG911 security-compliant for all personnel and equipment. These protections and/or an increased security posture must be in place for all future NG911 systems procured with Board funds. These requirements should align with Board-defined policies and procedures or a legislated mandate for all systems interfacing with the NG911 solution in Missouri.

3.5.5 Physical Security

Rating: 5.00

The Board does not have a permanent facility or office space.

Locally, PSAPs that access NCIC and/or the Missouri Uniform Law Enforcement System (MULES) must follow specifications for physical and network security. This includes limiting access to secure areas of buildings or escorting and logging guest access.

3.5.6 Staff Security

Rating: 6.00

The Board does not have a permanent facility or office space.

Individual PSAPs have a range of security requirements for full- and/or part-time employees and contractors. PSAPs that received an onsite inspection limited visitor access and required escorts to transverse the facility.

3.6 Geographic Information System

Technological advancements over the last 50 years necessitate a long-overdue fundamental change in the technology used to connect emergency callers to 911 centers. NG911 is meant to bridge the disparity between the communications technology used today and the antiquated systems implemented to support 911 operations dating back to the 1960s.

At the core of NG911 is GIS data. Spatially enabled GIS datasets drive the analytics that find the 911 caller (e.g., LVF) and determine the appropriate 911 center to which the emergency call should be routed (e.g., emergency call routing function [ECRF]). GIS datasets employed to fulfill these functions must be refined to public-safety-grade with exact geospatial accuracy and complete attribution of all information necessary for completing the complex queries.

There are seven core GIS datasets required for NG911 operation: address points, road centerlines, PSAP boundary, provisioning boundary, and emergency service (fire, law, EMS²¹) boundary polygons. These data will interact within the GIS to provide location validation and 911 call routing functions. Errors in any of these datasets potentially could delay 911 call delivery or result in the call being routed to the incorrect PSAP. In addition to complete and accurate attribution of every GIS dataset, geospatial accuracy is vital to proper functionality of the NG911 system.

In addition to meeting the requisite match rates between the GIS data and the legacy 911 tabular ALI and MSAG, Missouri jurisdictions also must improve the GIS data internally and with neighboring jurisdictions. Overlaps and gaps in individual polygonal datasets must be eliminated. Address points and road centerlines must be wholly contained within the provisioning polygon.

Although the migration to NG911 is being coordinated by the Board, the most accurate GIS data is developed and maintained by local jurisdictions. The further implementation of a large-scale, enterprise-wide capability such as geospatial data collection, aggregation, validation, and dissemination will require a tremendous effort through a phased approach, significant stakeholder coordination and collaboration, and adequate and sustained funding streams. However, by cooperatively implementing a program in adherence to nationally accepted standards, Missouri will position itself in a forward-thinking mode by

²¹ Emergency medical services

facilitating interoperable data-sharing practices that create flexibility and sustainability within its 911 program.

The MAPS tool examines seven key areas associated with GIS to help assess NG911 readiness.

- Production Environments
- Policy and Process
- Regional Coordination
- Training
- Support
- Addressing
- Data Readiness

Based on the MAPS assessment, a review of the documentation provided, and interviews with Board staff and GIS stakeholders in Missouri, MO911 achieved an overall score of **4.57** for GIS—a transitional state on the NG911 readiness continuum.

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MAPS NG911 Readiness Assessment

Missouri 911

GIS

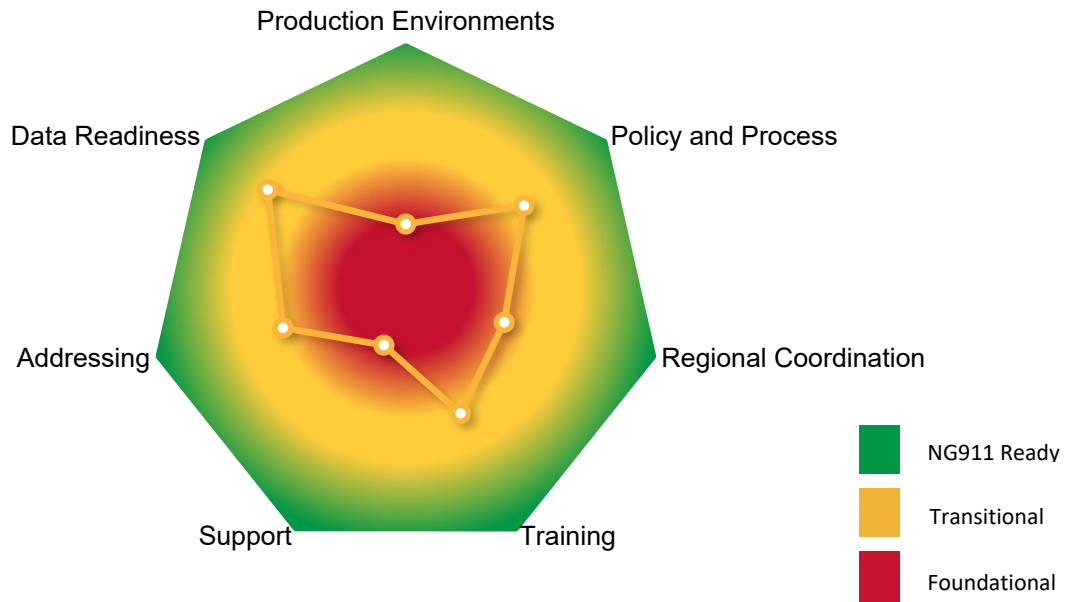


Figure 8: GIS MAPS

Table 7: GIS Readiness Scores

Lever	Overall Score	Production Environments	Policy and Process	Regional Coordination	Training	Support	Addressing	Data Readiness
GIS	4.57	3.00	6.00	4.00	5.00	2.00	5.00	7.00

3.6.1 Production Environments

Rating: 3.00

The Board has embarked on a statewide GIS assessment to evaluate the readiness of locally produced GIS layers to integrate into a future NG911 solution.

Production of datasets is locally focused by resources most familiar with daily changes, assignments, and standards related to addressing and associated required data layers.

The Board has reached out to other State agencies to coordinate data development, retention, hosting, and distribution. Coordination of GIS stakeholders, outside of public safety entities, is a key development that has been successful in the long-term viability of maintaining GIS resources.

3.6.2 Policy and Process

Rating: 6.00

The Board has embarked on a statewide GIS assessment to evaluate the readiness of locally produced GIS layers to integrate into a future NG911 solution. Over 90% of all PSAPs have provided GIS information for analysis, review, and gap identification.

The Board has established GIS policies that align with [NENA-STA-015.10-2018](#), *NENA Standard Data Formats for E9-1-1 Data Exchange & GIS Mapping*.

Further policies and processes documentation will need to be developed in concert with upcoming Board-initiated GIS data gap analyses and assessments.

3.6.3 Regional Coordination

Rating: 4.00

Regional and statewide coordination is essential for proper GIS data concatenation to develop the required datasets for NG911 deployment. Local jurisdictions have some regional collaboration, but these are small in numbers and are still migrating towards NENA standards.

The Board should develop formal agreements for local data submittals, sponsor regional training regarding data collection and submittals, and nurture a close working partnership and process with the localities.

3.6.4 Training

Rating: 5.00

The Board has certified specific GIS training curriculum for telecommunicators and has been directly involved in expanding the understanding of GIS requirements regarding NG911 sustainability.

The GIS assessment contractor is educating PSAPs on GIS layer requirements, remedial options, and NG911 requirements as it reviews each PSAP's results.

3.6.5 Support

Rating: 2.00

The Board relies upon the executive director's GIS experience and third-party resources, such as State resources and consultants, to support GIS. While the Board has supported some GIS training, the primary focus is on PSAP data development and the gap analysis study.

The Board foresees GIS support improving with the recommended addition of solution-specific training provided by a GIS integration provider.

3.6.6 Addressing

Rating: 5.00

The control of address assignment is delegated to local city, county, or regional authorities and is not within the Board's purview. Although the Board has developed minimum standards for the site/structure address point (SSAP) data layer and formatting to be integrated within future NG911 implementation projects, it does not currently require each PSAP to define the local method for address assignment, collection, and maintenance within its PSAP service area.

The Board should expand its guidance to include addressing support and define the minimum requirements for addressing data used for dispatching to correspond with actual address assignments in the field.

3.6.7 Data Readiness

Rating: 7.00

While the Board does not currently evaluate ALI and MSAG data, the Board has set standards for polygon and road centerline submittals. In 2021, the Board began a GIS readiness assessment on datasets and addressing databases based on submittals from each PSAP.

The assessment will highlight the jurisdictions that need remedial assistance or total rework of existing processes and data acquisition. A path to addressing the necessary corrections should be a central goal for the Board.

3.7 Operations

Many would say that implementing NG911 technology is the easy part. The more challenging part is operationalizing the processes, methods, and training, and managing the additional data and other support structures, such as continuity of operations (COOP) planning and incident management.

Having an operational state that supports the implementation of NG911 is one of the key factors in a successful implementation. Policies and training must exist that support both transitional and end-state

NG911. Having appropriate staff support for NG911 is also crucial—many managers and administrators at both the state and local level already are overwhelmed, wearing multiple hats each day. Without proper support, the needed tasks that are essential to the proper function of the NG911 environment may have to be added to an already overworked staff member. There is then a risk that these tasks are not completed in a timely manner or at all.

The planning for operational effectiveness in the NG911 environment requires all 911 stakeholders to review current operations and plan for the changes that will come. Effective operations involve coordination with stakeholders from across the state; thus requiring a supporting role from the Board to mediate and encourage operational changes that are consistent across the NG911 footprint.

The MAPS tool examines seven key areas associated with operations to help assess NG911 readiness.

- | | |
|---|---|
| <ul style="list-style-type: none">• Policies and Procedures• Support• Additional Data | <ul style="list-style-type: none">• COOP Plan(s)• Succession Planning• Training |
|---|---|

Based on the MAPS assessment, a review of the documentation provided, and interviews with Board staff and local stakeholders, MO911 achieved an overall score of **3.33** for operations—while this score is foundational, some work has been done towards the early phases of a transitional state on the NG911 readiness continuum.

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MAPS NG911 Readiness Assessment

Missouri 911 Operations

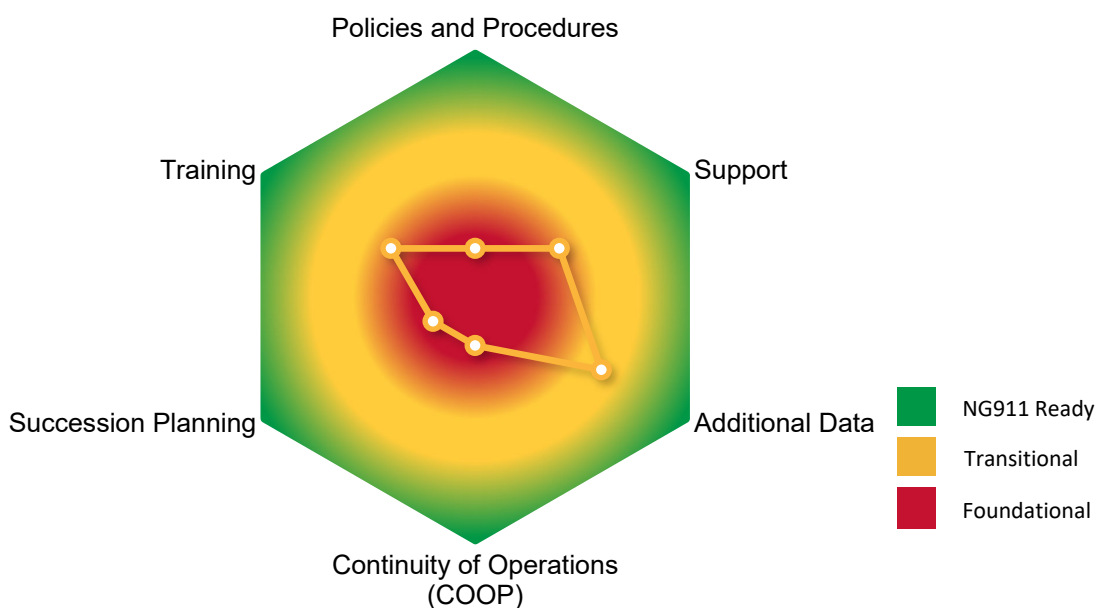


Figure 9: Operations MAPS

Table 8: Operations Readiness Scores

Lever	Overall Score	Policies and Procedures	Support	Additional Data	COOP Plan(s)	Succession Planning	Training
Operations	3.33	2.00	4.00	6.00	2.00	2.00	4.00

3.7.1 Policies and Procedures

Rating: 2.00

The Board has the authority to set policy and procedures and currently sets rules on training. However, the present Board has limited avenues to enforce rules. The Board sees its role as establishing best practices and/or guidelines and incentivizing PSAPs to adopt or follow best practices.

3.7.2 Support

Rating: 4.00

The Board's staff is limited to an executive director, supplemented by third-party contractors that administratively support the Board and coordinate the grant process. The Board is staffed to support current needs but lacks the appropriate subject-matter experts (SMEs) to support an NG911 solution for the state.

As Missouri moves forward with its GIS project—setting GIS standards and supporting aggregation services—and NG911 implementation, staffing with specific expertise in these areas is recommended.

Nationally, and in Missouri, PSAPs are experiencing a shortage of frontline personnel to handle 911 calls. Missouri PSAPs are also burdened with developing and keeping technical and GIS staff that are necessary to maintain the operational requirements of their current systems and anticipated NG911 requirements.

3.7.3 Additional Data

Rating: 6.00

The Board and individual PSAPs do not have specific policies on the use of additional data. NENA defines additional data as *“information which can be associated with a given emergency call, and is managed and sourced from outside the ESI net and its associated NG9-1-1 Core Services (NGCS).”*²² Some PSAPs use OTT software to obtain additional data (e.g., Rave Smart911 and similar products).

All 911 calls are public records and are governed by Sunshine Laws at a local level. Each locality sets its rules. RSMo 610.510 states that *“...: any information acquired by a law enforcement agency or a first responder agency by way of a complaint or report of a crime made by telephone contact using the emergency number, '911', shall be inaccessible to the general public. However, information consisting of the date, time, specific location and immediate facts and circumstances surrounding the initial report of the crime or incident shall be considered to be an incident report and subject to section 610.100.”*²³ The law does not mention the different media types that are related to 911, such as video or text.

There is not a State minimum for retention.

3.7.4 COOP Plan(s)

Rating: 2.00

911 service is seen as a local issue, and there are no requirements by the State that PSAPs have a COOP plan. COOP planning is under the auspice of the Missouri Department of Public Safety (DPS). While the

²² [NG9-1-1 Additional Data - National Emergency Number Association \(nena.org\)](https://www.nena.org/NG9-1-1-Additional-Data), section 2.

²³ RSMo 610.150 “911” telephone reports inaccessible, exceptions.
<https://revisor.mo.gov/main/OneSection.aspx?section=610.150>

Board has been requested to assist during an outage, there is no formal COOP plan. It is unknown if the DPS COOP plans contain provisions for 911.

3.7.5 Succession Planning

Rating: 2.00

Succession planning is a process for identifying and developing staff who can function in other roles. The Board has an informal succession plan; if the executive director is unavailable, a third-party contract employee functions in the role of director.

Board members serve their current terms and may remain until a replacement is identified. A formal orientation session for new Board and Committee members is encouraged. Additionally, a lack of a full Board roster currently creates quorum issues, and further vacancies will only magnify this issue.

Institutional knowledge of the Board and the 911 environment in Missouri is strong due to the dedicated involvement by many Board members; post-Board membership involvement during new member transition periods will assist with knowledge transfer.

3.7.6 Training

Rating: 4.00

The Board has a robust training certification process and has vetted and identified training modules that are available to all PSAPs. The current active classes included emergency medical dispatch (EMD), law, and other dispatcher-related duties as they relate to legacy 911 responsibilities.

Additional NG911-specific training is available for GIS curriculum. The GIS training curriculum for telecommunicators will be directly involved in expanding the understanding of GIS requirements regarding NG911 sustainability.

The GIS assessment contractor is educating PSAPs on GIS layer requirements, remedial options, and NG911 requirements as it reviews each PSAP's results.

Expansion of the Board-approved curriculum that specifically addresses NG911 operational items is encouraged and should include NG911 stress training, handling multimedia, and GIS discrepancy reporting.

4 Recommendations

This section presents recommendations for resolving challenges that the Board and MO911 face in its advancement toward NG911 readiness. In many cases, the transition to the NG911 end state is an iterative process and may take years to materialize. Technical and operational needs are intertwined and must be addressed in parallel to make the full transition to NENA i3-compliant NG911, which, in some cases, will require technology or compliance outside the Board’s sphere of influence.

The outlined recommendations are the basic steps in which an NG911 Strategic Plan is developed. The placement of each recommendation within a proper timeline, based on the Board’s and PSAPs’ available resources, will produce a work plan to achieve the Board’s stated goals for NG911 implementation. While the recommendations contain both long- and short-term tasks, each item builds upon solutions across categories to reach an end state in which an operational NG911 system is available to every PSAP that desires to participate.

4.1 Governance

The recommendations below are provided to address gaps in the governance area.

Table 9: Governance Recommendations

Category	Recommendations
Strategic Planning	<ul style="list-style-type: none"> Finalize 3–5-year NG911 strategic plan Continue to engage stakeholders and seek their input for the plan
Communication	<ul style="list-style-type: none"> Create a communications plan among the Board, stakeholders, and PSAPs using a variety of communications tools Continue to update and maintain the Board website Develop statewide marketing to support PSAP public education and hiring needs
Coordination	<ul style="list-style-type: none"> Initiate discussions with neighboring states
Technology	<ul style="list-style-type: none"> Expand technical expertise resources for the Board and committees Continue the involvement of Board committees in the development of the request for proposal (RFP) requirements and technical reviews of proposed NG911 solutions
Budgeting	<ul style="list-style-type: none"> Expand budget priorities towards NG911 implementation
Funding	<ul style="list-style-type: none"> Continue to pursue increased prepaid wireless collection rates
Staffing	<ul style="list-style-type: none"> Secure technical GIS SME resource to support PSAP submittals and state coordination of NG911 required datasets

Category	Recommendations
	<ul style="list-style-type: none"> Identify technical SME(s) to assist with grant reviews, planning and procurement of the ESInet and NGCS components, and ongoing oversight of acquired solutions
Standards and Best Practices	<ul style="list-style-type: none"> Engage stakeholders in developing technical, operational, and training standards and best practices Prioritize the standards and best practices to be created Identify the minimal benchmarks that define a primary PSAP

4.2 Next Generation 911 Core Services

The recommendations below are provided to advance MO911 toward the NG911 end state.

Table 10: NGCS Recommendations

Category	Recommendations
Technology Procurement	<ul style="list-style-type: none"> Establish technical requirements for NG911 solution
Functional Elements	<ul style="list-style-type: none"> Define NGCS standards and operational best practices that support the migration to end-state i3 requirements
Routing Solutions	<ul style="list-style-type: none"> Foster geospatial routing solutions
ALI DBMS and LIS	<ul style="list-style-type: none"> Coordinate migration from legacy ALI to a GIS-based solution
SLAs	<ul style="list-style-type: none"> Define SLA best practices, encompassing ESInet and NGCS components for the following (but not limited to): high reliability and availability, defects and replacements, and notification, response, and repair
Reporting and MIS	<ul style="list-style-type: none"> Define minimum NG911 reporting metrics and/or reports, including parameters and frequency
Interoperability	<ul style="list-style-type: none"> Promote network-to-network solutions for established NG911 providers in Missouri Ensure appropriate policies/legislation are in place to support (intra and inter) statewide interoperability
Call Transfer	<ul style="list-style-type: none"> Define technical and operational standards for the ability to transfer voice and data that includes ANI/ALI, text, audio, video, and other data

4.3 Emergency Services IP Network

The recommendations below identify some key requirements for a standards-based and future-proof ESInet that should be included in the RFP for a statewide ESInet.

Table 11: ESInet Recommendations

Category	Recommendations
Carrier Ingress	<ul style="list-style-type: none"> Foster the migration to non-CAMA network solutions
Interconnectivity	<ul style="list-style-type: none"> Initiate discussions with neighboring states and./or providers Create a plan to support interoperability and interconnectivity with other i3 ESInets as well as with legacy selective routers
Survivability	<ul style="list-style-type: none"> Adopt standards to address survivability, redundancy, security, and resiliency based on industry standards and best practices
Monitoring	<ul style="list-style-type: none"> Develop guidelines for network monitoring and reporting
Change Management	<ul style="list-style-type: none"> If the Board moves forward with procurement of a ESInet solution, a structured change management process should be included in the development of the RFP requirements
Reporting and MIS	<ul style="list-style-type: none"> Develop minimum reporting parameters and frequency
Bandwidth	<ul style="list-style-type: none"> Establish bandwidth goals and standards for connections to an ESInet solution
Netclock	<ul style="list-style-type: none"> As Missouri moves forward with an ESInet solution, identify best practices for local traceable time sources (typically GPS-based) at each ESInet connected facility
QoS	<ul style="list-style-type: none"> Identify minimum QoS thresholds for ESInet deployments
Documentation	<ul style="list-style-type: none"> Secure network and configuration documentation for all Board-funded projects

4.4 Call-Handling Equipment

The recommendations below are to help guide the procurement of CHE during the State’s transition to i3.

Table 12: CHE Recommendations

Category	Recommendations
I3-capable Call Handling	<ul style="list-style-type: none"> Define minimum requirements to connect CHE to ESInet solutions Determine if CHE requirements should be tied to grant funding
Text-to-911/Text-from-911	<ul style="list-style-type: none"> Create and communicate a statewide plan for text-to-911 deployment Engage PSAP operations personnel to develop standards and best practices regarding text-to-911 and text-from-911
Logging and Recording	<ul style="list-style-type: none"> Establish minimum logging recorder parameters to support the capture of traditional voice (phone or radio) as well as IP-based audio, when applicable
Mapping	<ul style="list-style-type: none"> Integrate GIS standards within the CHE solution and PSAP operational systems
MIS	<ul style="list-style-type: none"> Create policies regarding state-level aggregation, analysis, and use of MIS data from PSAPs
ADR	<ul style="list-style-type: none"> Engage PSAP personnel to identify all external data sources in use today and determine which ones align with NENA i3 specifications Promote solutions that integrate into national standards and support security policies

4.5 Security

The recommendations below are designed to help MO911 achieve a greater level of cybersecurity preparedness and become more cybersecurity aware as it moves towards NG911 readiness.

Table 13: Security Recommendations

Category	Recommendations
Cybersecurity Plan/Policy	<ul style="list-style-type: none"> Engage PSAP personnel to create cyber requirements Develop a statewide NG911 cyber plan based on TFOPA principles
Proactive Monitoring	<ul style="list-style-type: none"> Develop requirements ensuring regions monitor system health Require regions to report on system health

Category	Recommendations
Risk Assessment	<ul style="list-style-type: none"> Require local security and audits prior to establishing connectivity to statewide funded solutions
Logical Security	<ul style="list-style-type: none"> Develop requirements to ensure logical, physical, and staff security in compliance with current and future NCIC and/or MULES mandates while meeting the requirements of relevant national standards.
Physical Security	
Staff Security	

4.6 Geographic Information System

The recommendations below are designed to improve MO911’s geospatial capabilities and position it to fully support local and regional GIS programs.

Table 14: GIS Recommendations

Category	Recommendations
Production Environment	<ul style="list-style-type: none"> Foster and support the local development and ongoing maintenance of NG911-compliant GIS datasets
Policies and Processes	<ul style="list-style-type: none"> Define standards for data submittal, maintenance, and usage
Regional Coordination	<ul style="list-style-type: none"> Foster regional collaboration of data development and re-distribution to PSAPs via a GIS steward to store and manage statewide data
Training	<ul style="list-style-type: none"> Identify ongoing GIS training opportunities supporting the 911 community and their role in local GIS data development and integration into the PSAP
Support	<ul style="list-style-type: none"> Develop GIS resources to provide ongoing support to the PSAP community
Addressing	<ul style="list-style-type: none"> Engage PSAP personnel to identify best practices for address assignment, maintenance, and integration into datasets that support NG911 solutions
Data Readiness	<ul style="list-style-type: none"> Secure a data aggregation solution to provide statewide datasets for NG911 ingestion

4.7 Operations

The recommendations below are provided to address gaps in the operations area.

Table 15: Operations Recommendations

Category	Recommendations
Policies and Procedures	<ul style="list-style-type: none"> Solicit feedback from PSAP stakeholders to identify and prioritize the requirements, policies, and best practices they seek Engage Board committees to help develop requirements, policies, and best practices
Additional Data	<ul style="list-style-type: none"> Create a policy for the use of additional data after consulting federal and state statutes for guidance Update state record retention legislation to specifically address 911 produced information and additional data that is collected
COOP Plan(s)	<ul style="list-style-type: none"> Engage staff and stakeholders to develop a comprehensive COOP plan template for PSAPs that aligns with Federal Emergency Management Agency (FEMA) recommendations
Succession Planning	<ul style="list-style-type: none"> Secure or create succession training for PSAPs to increase depth for emergency backup and cross-train staff
Training	<ul style="list-style-type: none"> Conduct an external training needs analysis to identify the needs of the PSAP community Develop NG911 training requirements, policies, and best practices Conduct NG911 internal and external training Update the training curriculum as NG911 technology is deployed <ul style="list-style-type: none"> Include a section on occupational wellness focused on the stress of NG911

5 Conclusion

The Board has taken many steps to improve 911 services in Missouri while developing a plan for the transition to NG911. This MAPS assessment reveals that critical NG911 elements range from legacy to foundational to transitional states. Missouri has made great strides while burdened with limited resources in its approach to NG911 migration and recognized that local GIS and broadband services are a cornerstone toward building an NG911 system. However, as Missouri moves forward, it should keep technology at its forefront and recognize the impacts on public safety telecommunicators and local PSAPs while positioning solutions that are woven into a statewide NG911 system.