MISSOURI 911 SERVICE BOARD

MissionCriticalPartners
Because the Mission Matters

Next Generation 911 Recommendations

Report

PREPARED DECEMBER 2021 FOR
THE STATE OF MISSOURI

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Table of Contents

1 Overview

The Missouri 911 Services Board (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 and provide recommendations for an Emergency Services Internet Protocol (IP) network (ESInet) and NG911 infrastructure.

At the heart of the assessment were stakeholder interviews conducted using MCP's proprietary Model for Advancing Public Safety℠ (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 the Missouri 911 Service Board (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.

During the assessment process, several NG911-centric developments within Missouri were identified. These included regional ESInets, hosted call-handling equipment (CHE) solutions, geographic information system (GIS) initiatives, and NG911 Core Services (NCGS) implementations. The organic growth of these solutions, some with Board grant funds, represents basic NG911 components that can become the cornerstone to an integrated NG911 system that is available statewide.

The recommendations provided herein build upon these components while considering the needs and migration paths identified to implement a successful NG911 system. Unfortunately, the limited funding currently available to the Board hampers a forklift approach to securing a statewide solution.

However, there are advantages to building an NG911 system via the parallel development of the three essential components of an NG911 system: the ESInet, GIS/database, and NGCS/applications. All three are required for full functionality, but each has a unique development path, timeline to completion, and resources to finalize.

Therefore, MCP recommends five approaches that will shepherd Missouri through the migration to NG911, each with unique timelines, costs, and advantages, all of which should be weighted based on the Board's revenue availability (both current and future), partnerships, and ability to support local endeavors.

2 NG911 Approaches

2.1 Secure a Full NG911 System

The acquisition of a full NG911 system, to include the ESInet (public-safety-grade broadband connectivity) and NGCS (functional elements), which will support all PSAPs in Missouri, can be secured via the selection of a service provider of a Software as a Service (SaaS) solution. This approach has been followed by other state and regional entities with success. Typically, the service is secured for a three-to-five-year term or longer and is priced based on the served population.

NG911 solutions provided in this manner require the provider to secure broadband connectivity to each participating PSAP, data center, and other designated entities (e.g., secondary and backup facilities), usually at 10 megabits (Mb) minimum, with greater bandwidth and geodiverse path requirements for key mission-critical sites.

NCGS installations are proposed within a minimum of two Tier III or higher data centers to meet the five nines (99.999%) uptime requirements. The location of each data center shall be pre-approved by the Board to achieve network and software diversity and redundancy.

Based on the current progress of the development of NG911 systems within the two metropolitan areas of Missouri—St. Louis and Kansas City—the further implementation of NG911 services by a SaaS solution within these areas would be a duplication of effort. The St. Louis County 911 Communications Center and the Mid-America Regional Council (MARC) have contracted with service providers and are far into the implementation process. Both are currently within one year of full deployment, having secured the required ESInet, NGCS, and GIS components.

Therefore, Option A is to supplement these areas with a SaaS solution for the remainder of the state, with an estimated population of 2,380,000. This path will provide full NG911 services to the whole state but will still require integration into St. Louis County's and MARC's solutions.

If long-term funding is available, Option B provides NG911 services via the SaaS model to the entire state, with an estimated population of 6,150,000. Although more ambitious, Option B provides a statewide seamless solution with standardized features and costs spread over many years.

MCP offers the following recommendations:

- Define minimum standards for Board-funded NG911 solutions to include ESInet and NGCS operational, cybersecurity, monitoring, maintenance, and efficiency requirements
- Distinguish NG911 providers (ESInet and/or NGCS) that meet the Board's determined levels of service
- Establish the Board in a position to support NG911 system development to a minimum level and acquire solutions based on funding availability

2.2 Hybrid NG911 Implementation

The development of a statewide NG911 solution can be achieved by leveraging the regional NG911 systems currently under development while fostering new system implementations within geographic areas that have broadband and other resource limitations.

Through the Board's unique position to secure funding for broadband infrastructure development while defining the parameters for NG911 integration throughout the state, the Board can pursue new ESInet qualifying connections to PSAPs and other mission-critical locations. Based on strategic requirements, one path or diverse paths to facilities can be acquired and supported with a combination of non-recurring and recurring revenues.

However, this would only secure connectivity of individual PSAPs to data centers that host qualified NGCS operations. The acquisition, operation, and integration of NGCS are still required for PSAPs to operate within an NG911 environment. Each PSAP has a unique role within the NG911 ecosystem as a major contributor to the NGCS functionalities and, therefore, is closely paired with this pillar of NG911. This includes providing the required local GIS datasets, defining individual operational protocols, and identifying routing parameters.

The cost of NGCS and ESInet services is traditionally based on the served or supported population. Under this proposed model, each PSAP would support its share of NGCS expenses monthly, while the Board supports the ESInet requirements. With the expense of connectivity removed or greatly reduced, the continual cost to individual PSAPs to participate within the NG911 system would be reduced, often to a lower operational cost than today's legacy system.

MCP offers the following recommendations:

- Develop a cost-sharing partnership between the Board and qualifying PSAPs that leverages the Board's ability to secure funding for initial broadband development and limited ongoing recurring support (e.g., ESInet monitoring, service, etc.) while PSAPs absorb ongoing recurring costs for NGCS and GIS support requirements
  - Appropriately structured, each PSAP's recurring financial responsibilities are estimated to be lower than their current individual legacy 911 network and database costs

2.3 Network-to-Network Solutions

Once individual NG911 solutions are operational, the connectivity of these systems via a network-to-network interface to handle the exchange of voice, data, and supplemental information will be required. For systems that adhere to National Emergency Number Association (NENA) i3 standards, there are specific protocols to achieve the transfer of 911 calls between NGCS via individual ESInet connections. Originally, this interface solution was envisioned for state-to-state connectivity but has evolved to include any geographically adjacent jurisdictions (within a state or across regions) that operate on different NG911 systems.

Currently, with the support of Board grants and individual efforts, several ESInet developments have been initiated within Regions 1, 3, 4, 6, and 8. These are in addition to the two networks currently being managed by MARC (Region 2) and St Louis County (Region 7).

The networks within Regions 2, 3, and 7 have already identified NGCS providers. These jurisdictions are moving toward full NG911 systems upon the final integration of local GIS datasets and routing design protocols.

As Missouri works with adjacent states to integrate with their selected solutions as they mature into operation, a similar network-to-network integration path to sew together the patchwork of IP networks and the NGCS solutions within the state is recommended.

The Board is positioned to mediate and facilitate the development of network-to-network interfaces between current NGCS solutions in the state by engaging providers while providing funding and project management required to coordinate competing interests.

The goal is to enable the transfer of 911 calls across regions and between NG911 systems regardless of individual CHE vendors, telecommunications providers, or geographic location. This will quickly expand to include the ability to transfer across state lines to both legacy PSAPs and those using NG911 solutions, using resources already available within the state.

MCP offers the following recommendations:

- Align governance policies and guidelines for state grants to support the requirements for network-to-network integration. Define minimum standards for Board-funded NG911 solutions to ensure interoperability.
- Engage with current NGCS providers operating within Missouri to secure pricing, timelines, and known limitations related to implementing an integration solution
- Identify priorities for expansion of existing IP networks to meet NG911 standards while supporting migration to existing NG911 systems
- Pursue network-to-network interface between NG911 solutions operating within Missouri

2.4 Multi-CHE Deployment from an NGCS

With the implementation of IP networks providing reliable and fast connections between facilities, CHE has moved from siloed systems installed at individual PSAPs to more efficient host/remote solutions. There are many CHE solutions available to PSAPs, with many selecting a vendor based on the individual characteristics of their local operations (e.g., volume, size, agency type). A single solution is not appropriate for all PSAPs.

To date, the NG911 systems and host/remote solutions developed within Missouri have been paired with one CHE provider. This is efficient when the participating PSAPs share common traits (e.g., rural, metro, or size), but as NG911 systems expand geographically and span a more diverse population, a single CHE solution is no longer applicable for all agencies.

An NG911 system, specifically NGCS, can support multiple CHE solutions within its ecosystem while still meeting the efficiency, reliability, and interoperability goals for all participants. A choice of CHE provider by a PSAP should not be limited based on which NG911 system it chooses to use—the more efficient path is to provide a choice of CHE within an NG911 system, especially a system with diverse participants.

MCP recommends that the Board pursue the implementation of multiple CHE solutions within an NG911 system that has a diverse PSAP community to allow the selection of CHE that best aligns with the local jurisdiction's needs. This can be accomplished by either encouraging choices within an existing NGCS and/or acquiring additional CHE solutions to be installed in parallel. The appropriate path to achieve this goal is dependent on the resources available and cooperation from the PSAPs and NGCS providers.

The cost below is based on the Board acquiring a CHE package, but much lower costs would be appropriate based on PSAP and/or NG911 system cost-sharing arrangements.

MCP offers the following recommendations:

- Engage the PSAP community to identify current CHE usage, preferences, and costs
- Designate an NG911 system to facilitate the installation, implementation, and operation of a second (or third) CHE solution to host within the current configurations
- Align grant priorities to encourage the use of CHE vendors integrated into designated NG911 solutions within Missouri

2.5 GIS Layer Aggregation

The Board has recognized the importance of GIS and related datasets toward the success of NG911 solutions within Missouri. The current GIS assessment undertaken by the Board will highlight the strengths (and weaknesses) within individual jurisdictions while outlining the next steps to move forward.

Any solution will involve the creation of the required datasets that encompass the entire geographic area of each NG911 system operating within the state. However, it is more prudent to expand the requirement so that one statewide dataset is available for each layer—ensuring that boundaries are concurrent and all gaps and overlaps are eliminated.

To accomplish this task, a process and system are necessary for PSAPs to submit locally produced data to the Board (or their designee) to be collected and aggregated into a statewide layer. This requires standardized components, timely submittals, and a quality control process to constantly maintain data integrity. Once compiled, the data should be stored and available to all participants, including the NG911 providers, local PSAPs, and other participating agencies.

As a priority, the PSAP (i.e., jurisdictional) boundary for every entity directly accepting 911 calls in the state should be compiled into a statewide coverage layer. Once developed, this layer is somewhat static and would only be updated when PSAPs alter their call acceptance boundaries. However, this boundary is desired today by Voice over IP (VoIP) and wireless carriers to enhance their call routing abilities and third-party providers that currently provide hybrid enhanced locations to Missouri's PSAP community. The

acquisition of this layer is included in the cost estimate below but can be pursued independently and less costly, with a coordinated effort among local PSAPs, the Board, and partnering agencies.
To support the consistent development of GIS datasets across Missouri, the acquisition of LiDAR linked aerial imagery is recommended. The acquisition of the LiDAR control points, and the supporting infrastructure, is a one-time requirement that will support the initial imagery production and can be used for future aerial flights supported by the Board or any other state agency. The imagery will fulfill the needs of all the PSAPs while filling a void for each PSAP that does not have accurate or timely imagery today and those that use unreliable internet-based solutions to locate emergency calls.

Once secured and available within the 911 community, this essential base map should be leveraged to assist counties lacking 911 addresses and/or updated GIS data that meets the NG911 standards. The development of addressing and enhancement (or acquisition) of local GIS data can be time-consuming and often requires a multi-year time frame to reach accuracy, completeness, and support standards.

MCP offers the following recommendations:

- Continue outreach to local PSAP and GIS professionals to further educate communities on the standards, usage, and timeliness required for GIS datasets to successfully operate within an NG911 system
- Foster partnerships with other state agencies to collaborate resources and establish data-sharing parameters related to GIS layers to develop for NG911 and those developed by other entities that will be used within the PSAP community
- Acquire a statewide system for the development, maintenance, review, and submittal of NG911-required GIS datasets to a Board-designated entity or entities for aggregation and distribution
- Prioritize the development of a statewide PSAP boundary layer

3 Conclusion

As the Board continues to move forward with improving 911 services in Missouri through initiatives to provide access to Enhanced 911 and text-to-911 to all residents, parallel developments of the NG911 cornerstones are essential to setting the migration path to full NG911 service throughout the state. While the path forward can be plotted, the timeline is dependent on funding availability, standardization, and the Board's ability to guide and support the Missouri PSAP community.