



KENTUCKY
NG911
ROAD MAP

PREPARED NOVEMBER 2020 FOR THE KENTUCKY 911 SERVICES BOARD

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INTRODUCTION

This NG911 Road Map will guide the Kentucky 911 Services Board (Board) for the next three to five years as it transitions to Next Generation 9-1-1 (NG911). This road map provides an overview of the initiatives and supporting actions in the areas of governance, planning and policy; communications; technology; funding; and operations and training that will guide the Board toward its NG911 vision.

Approach

The Board contracted with public safety consulting company Mission Critical Partners, LLC (MCP) to assist with NG911 planning. To holistically understand the current state of 9-1-1 in Kentucky, and to better understand its priorities, MCP took several steps:

1. Collected and reviewed data provided by the Board
2. Conducted an in-depth NG911 Readiness Assessment using its proprietary Model for Advancing Public SafetySM (MAPS) tool
3. Conducted two facilitated strategic planning discussions with Board staff members and its NG911 work group to discuss its vision, mission, and priorities around NG911

MCP used the results of the readiness assessment blended with the outcomes of the facilitated sessions to develop this road map. A closer look at the MAPS assessment and the facilitated strategic planning sessions is provided below.

MAPS Readiness Assessment

The MAPS assessment is based on 60 conversational questions regarding seven NG911 readiness categories: governance, operations, NENA i3 routing and functional elements, Emergency Services Internet Protocol (IP) networks (ESInets), call-handling equipment (CHE), security, and geographic information systems (GIS). The questions were created using a range of recognized industry standards and best practices developed by organizations and workgroups such as the Task Force on Optimal Public Safety Answering Point (PSAP) Architecture (TFOPA), National Institute of Standards and Technology (NIST), National Emergency Number Association (NENA), and Association of Public-Safety Communications Officials-International (APCO). Responses to the questions are scored and placed into a Kiviati diagram to offer a high-level view of the areas requiring the most prioritized focus. The score for each readiness category and a detailed analysis is available in Appendix A.

Facilitated Strategic Planning

The first of the two facilitated strategic planning meetings on July 29, 2020, included six staff members that support the Board. Sixteen stakeholders, including members of the Board's Advisory Council and designated committees, were invited to attend the second meeting, held on August 18, 2020.

MCP helped each group craft and consider language that captured the Board's NG911 vision and mission and led both groups through the same strategic planning process using the "gameboard" methodology. This strategic planning methodology helps groups define the current state, desired future state, case for change, barriers to success, and strategy. Based on the list of important activities identified, both groups voted on what they believed should be the Board's top priorities.



MCP tallied the number of votes that each initiative received from staff members and stakeholders, then combined them to create an overall score for each initiative. The initiatives were then ranked—most important to least important—based on the highest to lowest number of votes it received. The outcomes are documented below.

Vision, Mission, and Priorities

Board staff and stakeholders agreed to the vision and mission, shown below; the initiatives and actions in this road map align with both.

KENTUCKY 911 BOARD VISION

Advocating for and empowering 9-1-1 centers to deliver the highest quality emergency services for the safety of Kentucky’s residents and responders.

KENTUCKY 911 BOARD MISSION

Our mission is to act as stewards of 9-1-1 funding and chart a path to the adoption of NG911 for all PSAPs.

The top strategic initiatives, identified by Board staff and stakeholders, are as follows:

Initiative	Staff Vote	Work Group Vote	Total Votes
Expand communication and outreach, to include education and training on technical Board initiatives, for elected officials and law enforcement leadership.	2	11	13
Update/create standards and policies from legacy 9-1-1 to NG911. Set the standard (service level) for a certified PSAP.	3	10	13
Implement cost effective statewide ESInet and NG911 Core Services (NGCS) that improves service and are governed by a non-law enforcement agency.	4	6	10
Review state-level funding model. Seek efficiencies in wireless funding.	3	7	10
Implement statewide GIS standard and dataset.	3	6	9



KENTUCKY 911 SERVICES BOARD'S ADVANCEMENT TOWARD NG911

Each initiative within this road map will help set the course for the Board's evolution toward NG911 readiness. One can imagine NG911 readiness as a continuum from one to ten. The MAPS assessment assigned the Board an overall score of 5.10. This indicates that Kentucky is in a transitional stage where the agency has implemented the preliminary steps for the transition to NG911. This level of readiness indicates that some technology is already in place and that Kentucky is well positioned to take the steps planning and implementing NG911.

In Figure 1 below, the gray represents where Kentucky is today across several readiness categories, and the yellow arrows represent the progress it will make as it implements the initiatives in this road map. This continuum represents the industry-accepted 9-1-1 maturity model and is designed to help agencies measure their progress toward end-state NG911.

To see the full level of detail regarding Kentucky's NG911 readiness, please see the MAPS assessment in Appendix A.

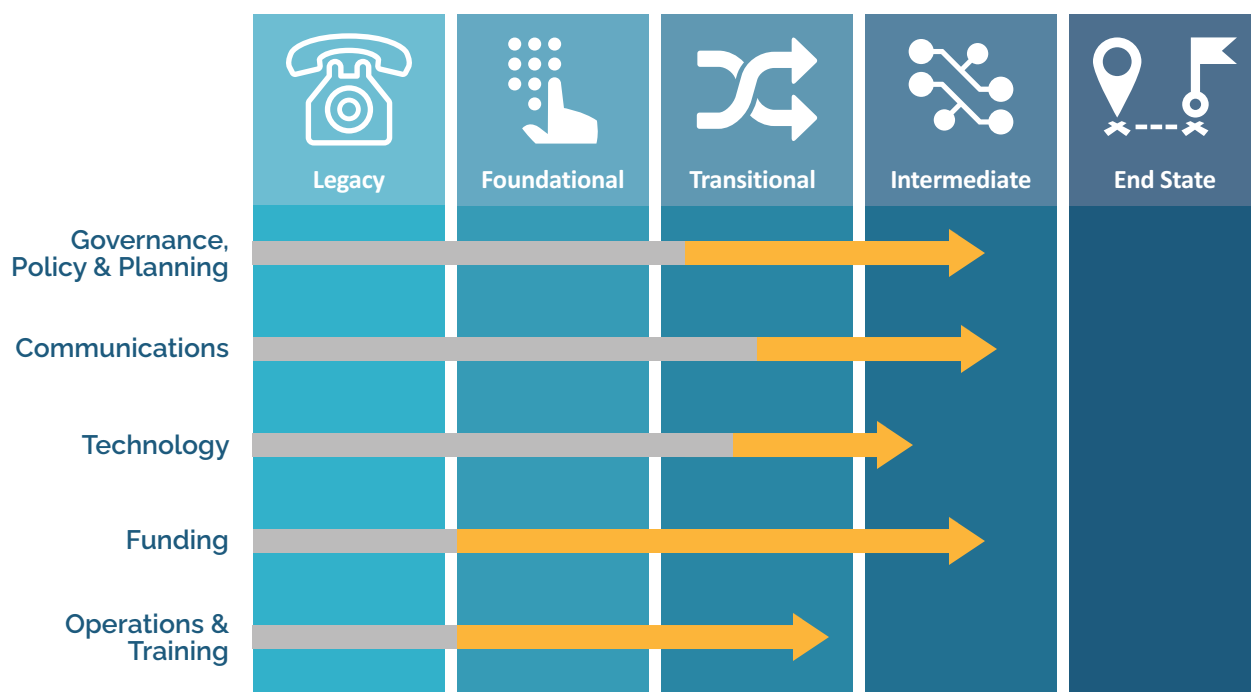


Figure 1: Kentucky 911 Services Board Progress Toward NG911 Readiness



FOCUS AREA	INITIATIVES	ACTIONS
Governance, Planning & Policy	Develop NG911 requirements, policies, best practices	<ul style="list-style-type: none"> • Define the differences (requirements, policies, best practices) • Update governance documents to clarify NG911 requirements, policies, etc. • Engage stakeholders for input on changes • Update PSAP certification requirements • Require use of scripted protocols for emergency medical dispatch (EMD)
	Strengthen governance for NG911	<ul style="list-style-type: none"> • Formalize committee charters and missions • Engage stakeholders in NG911 planning and request for proposal (RFP) requirements gathering • Establish NG911 interoperability work group
	Update legislation	<ul style="list-style-type: none"> • Focus on records retention of additional data and statutes to specifically include NG911
Communications	Create communications plan that expands outreach/education	<ul style="list-style-type: none"> • Document key messages, target audiences, timing, and methods • Update/maintain Board website
Technology	Procure NG911 ESInet and NGCS	<ul style="list-style-type: none"> • Weigh technical options, seek stakeholder input, and develop system requirements
	Continue executing on GIS plan	<ul style="list-style-type: none"> • Finalize current NG911-compliant GIS initiatives
	Develop cybersecurity plan	<ul style="list-style-type: none"> • Use security standards • Address network monitoring
	Procure management information system (MIS)	<ul style="list-style-type: none"> • Procure MIS • Define minimum NG911 reporting requirements (format, frequency, content)
	Implement text-to-9-1-1	<ul style="list-style-type: none"> • Develop statewide plan for implementation • Engage stakeholders to develop standards and best practices
Funding	Conduct NG911 funding study	<ul style="list-style-type: none"> • Identify data points to collect in order to determine operating costs for legacy 9-1-1 and NG911
	Create sustainable funding model	<ul style="list-style-type: none"> • Use data to evaluate opportunities for efficiencies, rate adjustments, sustainment costs
Operations & Training	Close training gaps	<ul style="list-style-type: none"> • Conduct internal/external gap analysis to identify desired training, training requirements, and curriculum
	Close staffing gaps	<ul style="list-style-type: none"> • Add technical staff • Build depth of organizational understanding • Develop a succession plan
	Develop continuity of operations (COOP) plan	<ul style="list-style-type: none"> • Require COOP plans as part of the certification process • Engage stakeholders to develop COOP plan template for local PSAPs

Table 1: Road Map of Kentucky NG911 Initiatives



GOVERNANCE, PLANNING & POLICY

Proper governance, planning and policies are critical components of a successful transition from legacy 9-1-1 to NG911. Governance, planning, and policies establish both a path to success and a baseline for how to traverse the path. Without them, every aspect of the transition faces increased risk.

Develop NG911 requirements, policies, and best practices

- Define distinction between requirements, policy, and best practices and how they apply to PSAPs (i.e., a requirement means it must be done while a best practice is a good idea)
- Update governance documents to clarify NG911 requirements, policies, etc.
 - » Updates should address cybersecurity, call routing, operations, data maintenance, quality assurance/quality improvement (QA/QI) and training, to name a few
- Solicit feedback from PSAP stakeholders to identify and prioritize what requirements, policies, and best practices they seek
- Engage subcommittees to help develop requirements, policies, and best practices
- Require PSAPs to use scripted EMD guide card protocols

PRIORITY

Update/create standards and policies from legacy 9-1-1 to NG911. Set the standard (service level) for a certified PSAP.



Develop and execute NG911 implementation plan

- Use the readiness assessment and this road map to document the tasks, owners, and timelines for implementing NG911 in Kentucky
- Develop benchmarks for progress

Strengthen governance structures to support NG911 transition

- Formalize committee charters and missions
- Engage stakeholders already serving in governing bodies—like the Advisory Council and Education/Technical Committee—in developing RFP requirements
- Establish an NG911 interoperability working group to:
 - » Continue high-level conversations with surrounding states (Tennessee, Indiana, Virginia, and Ohio) to identify best practices
 - » Recommend policies and/or standards to improve interoperability, including NENA's i3 specifications for communication between ESInets
 - » Work with NG911 service providers to ensure interoperability during procurement, contract negotiations, and solutions implementation—at both the network and service level

Update legislation

- Update State records retention legislation and regulations to address the retention of additional data that is collected in an NG911 environment
- Review and update legislative statutes to include NG911 topics and to be in alignment with the *Guidelines for State NG911 Legislative Language* created by the National 911 Program in partnership with the National Association of State 911 Administrators (NASNA)



COMMUNICATIONS

Communication is one of the simplest and least utilized tools for success during times of change. Frequent communication enhances trust, builds relationships, and helps stakeholders lend a voice to a conversation, leading to greater understanding, support, and buy-in on critical initiatives.

Create a communications plan that expands outreach and education

- Help educate and inform stakeholders about the NG911 initiative, project tasks and milestones, and any possible impacts that can be expected throughout the transition
- Create a consistent and reliable communication rhythm
 - » Monthly email updates
 - » Quarterly newsletters
 - » Annual or bi-annual PSAP satisfaction surveys
- Document key messages, timing of messages, target audiences and best methods of communication
- Ensure website update is a key component of plan
- Identify stakeholders and ensure stakeholder engagement is key component of plan
 - » Explain how the Board will coordinate communications with the Advisory Council, stakeholders, and PSAPs
 - » Engage Advisory Council, Technical Committee, and PSAP stakeholders in developing RFP requirements and reviewing technical proposals

PRIORITY

Expand communication and outreach, to include education and training on technical Board initiatives for elected officials and law enforcement leadership.





TECHNOLOGY

While IP networks are a foundation of NG911 and provide greater flexibility, survivability, and access to data, the benefits of connectivity also mean these public safety and mission-critical systems face a greater risk of attack. The initiatives that follow are high priority tasks to undertake to ensure that the Board maintains high quality, reliable and secure NG911 systems.

Procure the best technical NG911 solution for Kentucky

- The Board must weigh the challenges and opportunities to determine the best path forward for NG911 in Kentucky. Options include:
 1. One single ESInet/NGCS solution, which would force existing regional ESInets to migrate to the state's ESInet as soon as practical
 2. A hybrid solution that allows those regions that have already deployed an NG911 solution or ESInet to connect to the state ESInet/NGCS solution
 3. Build out a statewide ESInet in phases:
 - Phase 1—Deploy ESInet infrastructure to all areas not currently served by existing ESInet services
 - Phase 2—Interconnect state ESInet with all regional ESInet platforms in Kentucky, testing and confirming interoperability along the way
 - Phase 3 (optional)—Migrate all regional ESInets onto the state ESInet solution
- Develop a common set of guidelines or requirements for the selected solution and ensure the solution complies with industry standards and enhances interoperability

PRIORITY

Implement cost-effective statewide ESInet and NGCS that improve service and are governed by a non-law enforcement agency.

Implement statewide GIS standard and dataset.



Continue implementing GIS plan

- Finalize the development of GIS dataset requirements
 - » Update the Board's Kentucky NG911 Mapping Guide
- Secure a solution for PSAP data submittal and data aggregation
 - » Provide continual training opportunities for selected solution
- Continue GIS training
 - » Develop GIS for PSAP guidance document
 - » Introduce GIS for NG911 training for GIS professional audience
- Update Kentucky Administrative Regulations (KAR) to reflect revised GIS requirements
 - » Expand Geoaudit parameters
 - » Specify PSAP mapping standards

Continued on page 8 >>



>> *Continued from page 7*

Develop a cybersecurity plan

- Utilize TFOPA's security standards document to create a plan to address cybersecurity threats and mitigate vulnerabilities
 - » Include industry standards and best practices for PSAPs to apply to protect the network and other PSAPs residing on it
 - » Include strategy for improving network monitoring that provides state-level snapshot of situational awareness and PSAPs with better insight on outages

Procure a Management Information System (MIS)

- Procure an MIS to better understand a variety of metrics to help improve overall system performance including percentage of calls delivered, length of time for call delivery, system outages, etc.
- Define and document minimum NG911 reporting metrics, including format and frequency, for all PSAPs

Implement Text-to-9-1-1

- Create and communicate a statewide plan for text-to-9-1-1 deployment
 - » Design and launch a text-to-9-1-1 public service campaign
- Engage PSAP operations personnel to develop requirements, standards, and/or best practices for text-to-9-1-1 and text-from-9-1-1



FUNDING

Proper funding is imperative not only for the transition to NG911, but to ensure standards of service in operating current 9-1-1 systems. Without a thoughtful and measured funding model that ensures nobody is left behind in the transition to enhanced technology, there will inevitably be disparity in the level of 9-1-1 service delivered statewide.

The Board recognizes that funding both legacy and NG911 systems concurrently will exceed the general operations budget that is collected today and it must take steps to ensure understanding of the operational and sustainment costs of 9-1-1 and NG911.

Today jurisdictions set their own rates for local 9-1-1 fees, which are collected at the local level using methods they choose, whereas the Commonwealth determines wireless 9-1-1 fee rates, collection, and disbursement method. Regardless, the revenue generated by the local (non-wireless) and Commonwealth (wireless) fees still leave PSAPs underfunded.

Conduct an NG911 funding study

- Conduct a funding study to understand the true costs of operating both the current system and NG911 and help determine:
 - » How to increase efficiencies and eliminate costs
 - » Whether to adjust 9-1-1 fees and, if so, by how much
 - » Which NG911 procurement option is best for the state
 - » How to sustain NG911 costs
 - » How to create a sustainable funding model

PRIORITY

Review state-level funding model. Seek efficiencies in wireless funding.





OPERATIONS & TRAINING

NG911 is often discussed as a technology issue, and it is, but it is equally challenging to operationalize the technology. The Board's support of operational challenges during migration to NG911 is essential to the success of the transition. The Board stands positioned to provide PSAPs with guidance through training, procedural development support, and financial incentives as they adopt successful NG911 protocols.

Identify and close training gaps

- Conduct an internal needs analysis to assess gaps in staff skillsets and seek training to augment the current knowledge base
- Conduct external training needs analysis to identify the needs of the PSAP community
- Develop NG911 training requirements and curriculum
- Ensure state training curriculum meets the *Recommended Minimum Training Guidelines for the Telecommunicator*¹
- Conduct NG911 internal and external training
 - » As more types of digital media become available to public safety telecommunicators, training on how to process these calls and the different technologies will need to be created
 - » Exposure to video in NG911 will also likely introduce significant new stress to the telecommunicator, requiring Kentucky to consider including NG911-specific stress training

Close staffing gaps

- To support NG911, the Board must add staff members with technical 9-1-1 subject matter expertise to assist with the planning and procurement of NGCS and ESInet implementation
- Develop a succession plan to ensure continuity of business
- Cross-train staff members and/or provide training that helps build their depth of organizational understanding

Develop COOP plan

- Expand PSAP requirements to include a COOP plan as part of the certification process
- Engage staff and stakeholders to develop a comprehensive COOP plan template for PSAP agencies that aligns with Federal Emergency Management Agency (FEMA) continuity communications recommendations, including an annual review process

¹ "Recommended 911 Minimum Training for Telecommunicators." 911.gov.
https://www.911.gov/project_recommended911minimumtrainingfortelecommunicators.html



CONCLUSION

The Kentucky NG911 Road Map was designed to guide the Board toward its desired future for NG911. The initiatives laid out in this road map will help the Board make the progress it must in the areas of governance, planning and policy; communications; technology; funding; and operations and training.

The Board is poised to execute on the initiatives detailed in the road map, and in doing so, will address its top priorities:

1. Expand communication and outreach, to include education and training on technical Board initiatives, for elected officials and law enforcement leadership.
2. Update and create policies and best practices for NG911. Set the standard (service level) for a certified PSAP.
3. Implement cost-effective statewide ESInet and NGCS that improve service and are governed by a non-law enforcement agency.
4. Review state-level funding model. Seek efficiencies in wireless funding.
5. Implement statewide GIS standard and dataset.



APPENDIX A

KENTUCKY NG911 READINESS ASSESSMENT

The Kentucky NG911 Readiness Assessment can be found on the pages that follow.



MissionCriticalPartners
Because the Mission Matters

Appendix A
NG911 Readiness Assessment

Final Report

PREPARED DECEMBER 2020 FOR
THE COMMONWEALTH OF KENTUCKY
911 SERVICES BOARD

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1 Introduction

Since 2008, the Commonwealth of Kentucky (Commonwealth) 9-1-1 community has been planning for the transition from a legacy 9-1-1 environment to a Next Generation 9-1-1 environment (NG911)¹. The Kentucky 911 Services Board (Board) sought to evaluate where the state is today and where it needs to be for a successful transition to NG911. In July 2020, the Board and Mission Critical Partners, LLC (MCP) collaborated to assess the Board's ability to support an NG911 environment and to help methodically guide it toward achieving its mission and vision. MCP took a multimodal approach—not just evaluating Kentucky's current state but also seeking to understand Kentucky's desired future state and what challenges Kentucky may face along the way.

1.1 Background and History

1.1.1 Kentucky 911 Services Board

The initial version of the Kentucky 911 Services Board was formed in 1998 to develop statewide wireless 9-1-1 operational standards and implement the legislative distribution formula for Commercial Mobile Radio Service (CMRS) fees as enacted within Kentucky Revised Statutes (KRS).

The 2018 legislative session updated KRS 65.7623, which along with other changes, reorganized the Board's organizational structure, established the Board's membership as seven members and developed an Advisory Council made up of 9-1-1 subject matter experts (SMEs) and stakeholders. Management of the daily operations of the Board falls under the organizational frame of the Kentucky Office of Homeland Security.²

A Board administrator, who reports directly to the executive director of the Office of Homeland Security, supports the Board, manages the staff, and is the designated state 9-1-1 coordinator. The Board has four additional staff members that support the Board's initiatives and daily operations, including fund distribution, grant management, geographic information system (GIS) support, and public safety answering point (PSAP) relations.

The Board has developed requirements for PSAPs to operate effectively in a legacy Enhanced 9-1-1 (E9-1-1) environment. The Board has developed regulations for an individual PSAP to secure Board funding via an initial and ongoing certification process that requires PSAPs to meet or exceed minimum operational standards.

¹ In Kentucky, both 9-1-1 and NG911 are used. In cases of NG9-1-1, it is an industry standard document title, industry reference, or quote.

² 65.7623 Kentucky 911 Services Board – Members – Expenses – Budget – Advisory council.
<https://apps.legislature.ky.gov/law/statutes/statute.aspx?id=47984>

Board staff actively participate in numerous national, state, regional, and local workgroups to find operational and technical solutions to issues challenging the state's PSAPs, in addition to providing resources for participation in committees and workgroups.

1.1.2 Advisory Council

The Advisory Council is appointed by the executive director of the Office of Homeland Security. The Council is charged with representing the interests of the 9-1-1 community. Members of the Council represent the following organizations:

- Kentucky State Police
- Kentucky Sheriffs' Association
- Kentucky Association of Chiefs of Police
- Kentucky Fire Chiefs Association
- Kentucky Ambulance Providers Association
- Kentucky League of Cities
- Kentucky Association of Counties
- Department of Criminal Justice Training
- Kentucky Board of Emergency Medical Services
- Kentucky Chapter of the Association of Public-Safety Communications Officials (APCO)
- Kentucky Chapter of the National Emergency Number Association (NENA)
- Any other members selected by the executive director

2 Approach and Methods

To holistically understand the Board's readiness for NG911, MCP collected and reviewed data provided by the Board and facilitated two strategic planning discussions with Board staff and various 9-1-1 stakeholder groups. Recognizing that the transition from legacy 9-1-1 is significant and goes beyond the replacement of technology, MCP focused on understanding the current operational processes, staff policies, governance (policies, procedures, and bylaws), funding models, and technical networking and architecture.

Further, MCP conducted interviews with key staff members using its proprietary Model for Advancing Public SafetySM (MAPS) tool to assess Kentucky's readiness for an NG911 environment. The MAPS assessment is designed to incorporate a range of recognized industry standards and best practices developed by organizations and workgroups such as the Task Force on Optimal Public Safety Answering Point (PSAP) Architecture (TFOPA), National Institute of Standards and Technology (NIST), and NENA (national), and APCO (national). The tool includes customized questions that are grouped into topic-specific categories based on best practices and industry standards.

Board staff were asked 60 conversational questions regarding seven NG911 readiness categories: governance, operations, NENA i3 routing and functional elements, Emergency Services Internet Protocol (IP) networks (ESInets), call-handling equipment (CHE), security, and GIS. Staff's responses to these

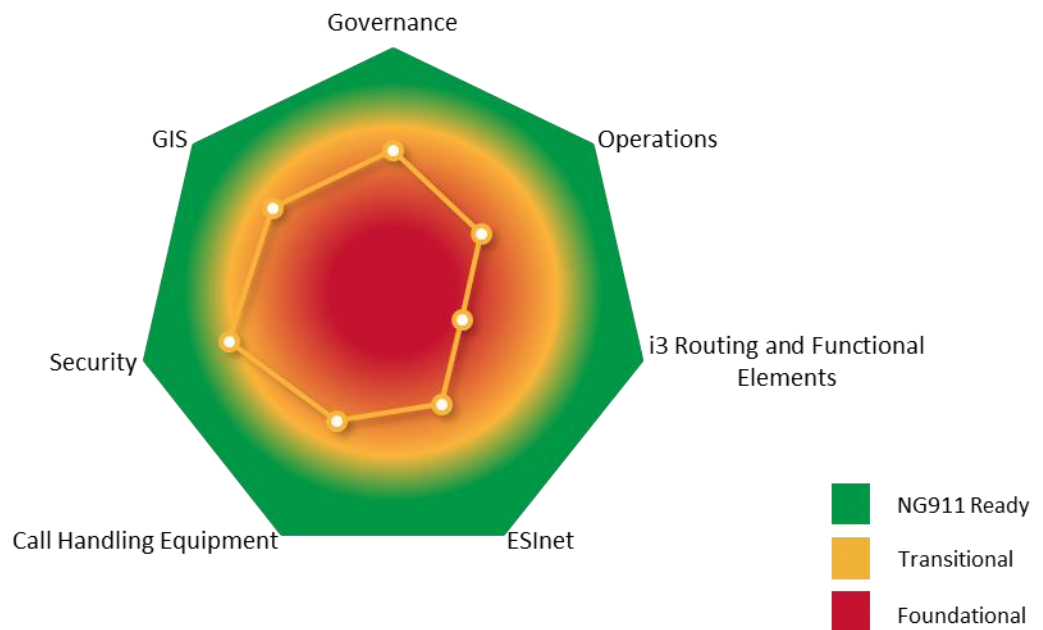
questions were scored and the resulting diagram reveals a high-level view of the areas requiring prioritized focus. The comprehensive MAPS assessment becomes a customized blueprint for developing a strategic plan.

3 Current State

If one imagines NG911 readiness as a continuum from one to ten, where a rating of one (1) represents “foundational,” five (5) represents “transitional,” and ten (10) represents “NG911 ready,” the MAPS assessment assigned Kentucky an overall score of **5.10**.

This indicates that Kentucky is in a transitional stage where the Board has implemented the preliminary steps for the transition to NG911.³ This level of readiness indicates that some technology is already in place and that Kentucky is well positioned to take the next steps in planning and implementing NG911.

MAPSSM NG911 Readiness Assessment Kentucky 911 Services Board



³ Task Force on Optimal Public Safety Answering Point Architecture (TFOPA) Working Group 2 Phase II Supplemental Report: NG9-1-1 Readiness Scorecard. https://transition.fcc.gov/pshs/911/TFOPA/TFOPA_WG2_Supplemental_Report-120216.pdf

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	6.00	4.00	4.00	6.00	4.00	5.00	10.0	10.0
Operations	4.44	2.00	4.00	6.00	6.00	8.00	4.00	4.00	4.00	2.00	
i3 Routing and Functional Elements	2.78	3.00	2.00	2.00	2.00	4.00	2.00	4.00	2.00	4.00	
ESInet	4.40	6.00	3.00	4.00	6.00	3.00	4.00	6.00	4.00	6.00	2.00
CHE	5.14	7.00	4.00	4.00	5.00	4.00	8.00	4.00			
Security	6.67	6.00	4.00	4.00	8.00	8.00	10.0				
GIS	6.14	4.00	8.00	8.00	5.00	4.00	8.00	6.00			
Overall Score	5.10										

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 among Board staff, the Board, PSAPs, the General Assembly, service providers, emergency responders, and other stakeholders. 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 9-1-1 to NG911 because the transition impacts every aspect of 9-1-1—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 Board staff, the Board and stakeholders is key to this transition.

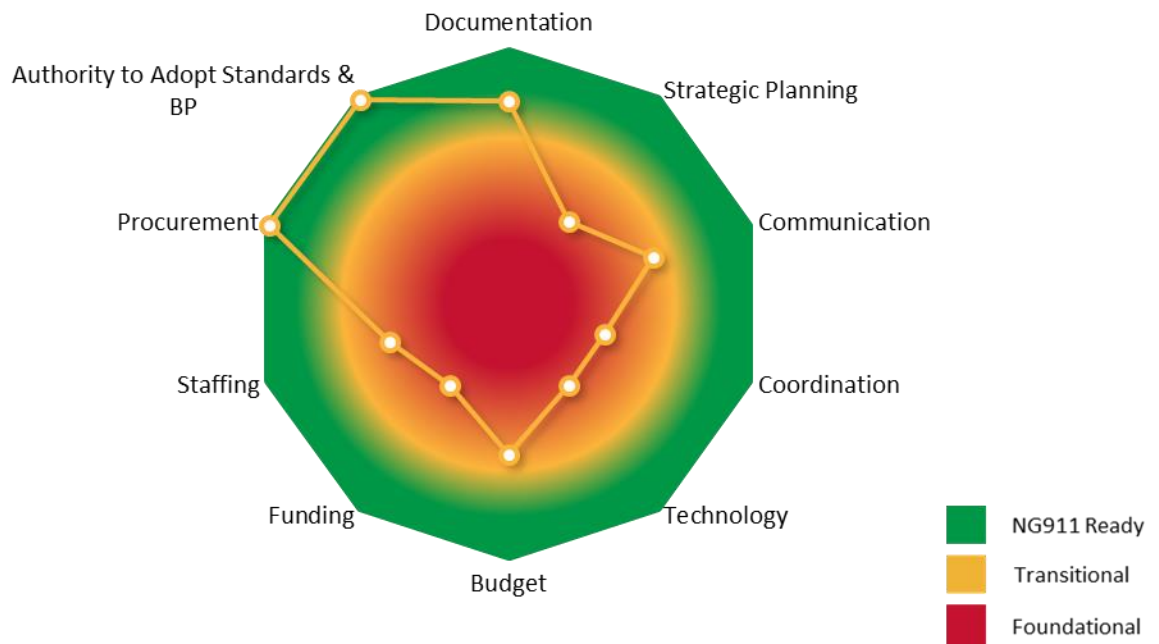
[TFOPA](#) was created to provide a framework for readiness and maturation of the NG911 transition model from foundational to end-state NENA i3 (i.e., NG911). The MAPS assessment overlays the TFOPA framework, as well as industry standards and best practices, to develop a baseline from which to plan and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

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

- Documentation
- Strategic planning
- Communications
- Coordination
- Technology
- Budget
- Funding
- Staffing
- Procurement
- Authority to adopt standards and best practices

Based on the MAPS assessment, a review of the documentation provided, and interviews with Board staff and Board members, the Board receives a comprehensive score of **6.10** for governance. This score places governance in the transitional state on the NG911 readiness continuum.

MAPSSM NG911 Readiness Assessment Kentucky 911 Services Board Governance



Lever	Overall Score	Documentation	Strategic Planning	Communications	Coordination	Technology	Budget	Funding	Staffing	Procurement	Standards and Best Practices
Governance	6.10	8.00	4.00	6.00	4.00	4.00	6.00	4.00	5.00	10.0	10.0

3.1.1 Documentation

Rating: 8.00

The Board, under KRS 65.7633, has been given the authority to “implement the provisions of KRS 65.7621 to 65.7643 through the promulgation of administrative regulations in accordance with the provisions of KRS Chapter 13A.”⁴ The Board is responsible for establishing the certification requirements of agencies that are capable of handling wireless calls. Additionally, the Board establishes procedures and guidelines to approve or disapprove disbursements from the CMRS fund and the parameters for the CMRS grant process.

The Board has the authority and a process is in place to modify the regulations as needed. And while the regulations do not specifically address NG911, there is a definition of NG911 and some framework in place, stating that the board shall “Coordinate and assist in the implementation of new technology in the operation of emergency telecommunications in the state.”⁵

State legislation created and defines the role and membership of a 9-1-1 Advisory Council that provides direct recommendations to the Board. However, there is no formal charter detailing the specific vision, mission, or objectives the Council wants to accomplish. The Council only has two SMEs with direct 9-1-1 expertise as part of the mandatory membership.

The Board does have the purview to stand up subcommittees as needed, and recently formed educational and technical working groups. There are no committee charters.

⁴ “65.7633 Promulgation of administrative regulations by board.” <https://apps.legislature.ky.gov/law/statutes/statute.aspx?id=45292>

⁵ “202 KAR 6:050. PSAP certification.” <https://apps.legislature.ky.gov/law/kar/202/006/050.pdf>

3.1.2 Strategic Planning

Rating: 4.00

The Board first undertook developing an NG911 strategic plan in 2008; it was last updated in August 2009. Since the plan's inception, the technology surrounding NG911 has evolved, and the plan does not properly address the technology and resource needs of today. While some of the actionable items in the plan have been addressed, some gaps still exist.

Currently, the Board is actively updating its strategic plan and developing a road map and implementation plan to include the transition to an NG911 environment. The Board engaged a diverse range of stakeholders to update the plan.

3.1.3 Communications

Rating: 6.00

While there is no formal documented communications plan, the Board uses multiple avenues to convey progress and messages; however, messages are more ad hoc, which can be inconsistent and irregular. The Board does have a website that provides updates and copies of meeting minutes, but the information is basic.⁶

Board staff present at multiple meetings and conferences during the year, to include:

- Board meetings
- Quarterly meetings of Kentucky chapters of NENA and APCO
- Kentucky Emergency Services Conference
- Kentucky 9-1-1 Summit
- Telecommunications Advanced Leadership Kentucky (TALK) Conference

Additionally, the Board has developed and delivered targeted messages for local authorities (mayors, county administrators, etc.) as well as legislative committees to bring 9-1-1 issues to the forefront and attention of decision makers.

3.1.4 Coordination

Rating: 4.00

Board staff have begun high-level conversations with surrounding states (Tennessee, Indiana, Virginia, and Ohio), but recognize that those states are further along in the NG911 transition process. However, Kentucky has identified GIS as a top priority to begin to bridge the gap for interoperability.

⁶ "Kentucky 911 Services Board." Ky.gov. <https://911board.ky.gov/Pages/index.aspx>

3.1.5 Technology

Rating: 4.00

As of September 2020, the Board has formed an education committee, which also addresses technical standards. However, the charge of the committee is still in the formative stages. While PSAPs are pushing for the adoption of minimum technical requirements standards, it is unsure of the role the Board will play in the development of these standards. The Board recognizes that it lacks technical expertise in this area.

3.1.6 Budget

Rating: 6.00

The Board recognizes that both funding legacy and NG911 systems concurrently will exceed the Board's general operations budget based on the fees collected today. The Commonwealth has taken the first steps to address the shortfall and has established an NG911 fund directly funded via CMRS fees—currently estimated at \$850,000 annually. Kentucky also is using federal grant funds to assist in the funding of foundational NG911 projects.

It is not clear how much funding will be needed in total to transition local PSAPs to NG911. While some localities have started to plan, many are not clear on what is needed for the transition and the impact of NG911 implementation. It also remains unclear regarding the level of funding that will be needed to support the ongoing operation of an NG911 solution as no formal cost analysis has been conducted.

The auditing oversight provided by Board staff should be commended. It is detailed, thorough, timely, and well documented in an annual report.

3.1.7 Funding

Rating: 4.00

Kentucky 9-1-1 funds are collected in several manners. Local 9-1-1 fees (non-wireless) are collected by local jurisdictions (counties, towns, cities, etc.) which can set their own rates and collection method. Monthly rates range from \$0.75 to \$7.00. Local 9-1-1 fees generated \$37,186,297 in revenue during the 2019 reporting period. Under KRS 65.760, all fees collected for 9-1-1 are required to be used for 9-1-1 expenditures.⁷

The Board oversees the collection of 9-1-1 wireless fees as outlined within KRS 65.7629⁸. Wireless fees generate about \$34,000,000 yearly. In 2017, under KRS 65.7635, Kentucky began collecting postpaid fees

⁷ 65.760 Establishment of 911 emergency telephone service by local government -- Sources and disposition of revenues – Funding. <https://apps.legislature.ky.gov/law/statutes/statute.aspx?id=45284>,

⁸ 65.7629 Powers and duties of board. <https://apps.legislature.ky.gov/law/statutes/statute.aspx?id=45289>.

at a flat rate of \$0.93 on each retail transaction.⁹ The prepaid service charge \$0.70 wireless fee, per device per month, has not changed since its establishment in July 1998¹⁰. Yet today, wireless 9-1-1 calls account for over 80% of all emergency call volume in the state. The Board does not set the wireless fee but may recommend adjustments to the Commonwealth legislative body.

For each dollar collected, \$0.975 is returned to directly support local PSAPs, with \$0.025 used to fund Board operations. KRS 65.7631(6)(a) states that no PSAP shall be eligible to request or receive a disbursement from the CMRS fund unless and until the PSAP demonstrates that the PSAP has made the investment which is necessary to allow the PSAP to receive and utilize the data elements associated with wireless E911 service.¹¹

The revenue generated by the local and wireless fees still leaves PSAPs underfunded. During fiscal year 2020, local PSAPs sought \$48,629,649 in local general funds to supplement their operational budgets. Most local revenues are based on fees placed upon landline devices (phones, Voice over IP [VoIP], etc.), but use of landline phones has significantly decreased. Such decreases have prompted local governments to make up the difference with ever-increasing landline fees and the use of general funds, as wireless fees fall short of fulfilling this revenue gap. In fact, general funds make up 35% of the funds spent on 9-1-1 in Kentucky, as shown below.

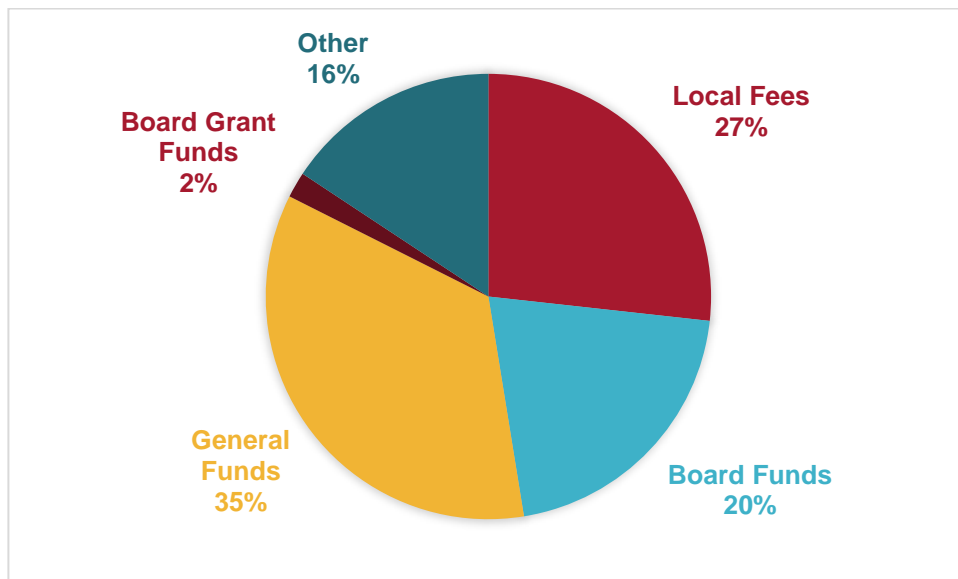


Figure 1: 9-1-1 Funding Sources

⁹ 65.7635 Duty of commercial mobile radio service providers to act as collection agents for postpaid service charges for fund. <https://apps.legislature.ky.gov/law/statutes/statute.aspx?id=45293>

¹⁰ <https://apps.legislature.ky.gov/law/statutes/statute.aspx?id=45289>, 65.7629 Powers and duties of board.

¹¹ Chapter 6 – 911 Services Board. <https://apps.legislature.ky.gov/law/kar/TITLE202.HTM> ,

According to the 2011 report *911 Services and Funding: Accountability and Financial Information Should Be Improved*, it was noted, even nine years ago, that the “funding system creates disparities between residents in different jurisdictions and among types of service providers.”¹² This finding is still evident and true today.

3.1.8 Staffing

Rating: 5.00

Overall, the Board is partially staffed to support NG911. The Board is adequately staffed to provide robust administrative, financial, and GIS support. This leaves a gap in technical subject matter expertise specifically as it relates to NG911 Core Services (NGCS) and ESInet implementation.

3.1.9 Procurement

Rating: 10.0

The Board has derived the authority from various statutes, rules or regulations, to engage in the procurement process for NG911 system components.

3.1.10 Authority to Adopt and Enforce Standards and Best Practices

Rating: 10.0

The Board has the authority from statute to establish, adopt, and enforce standards, guidelines, and best practices in support of NG911 implementation and operations. 202 Kentucky Administrative Regulations (KAR) Chapter 6 – 911 Services Board, while not implicitly specific to NG911, does contain some basic framework.

KRS 65.7621 defines NG911 as:

“Next generation 911” means a 911 system where any device capable of making a 911 emergency request uses digital technology through managed emergency services Internet protocol networks composed of functional elements and databases that replicate enhanced 911 features and functions while providing additional multimedia capabilities for the PSAP. “Next generation 911” includes any technology, functions, capabilities, best practices, or processes, either currently existing or later developed, that will be used during and after the transition of the delivery of 911 services from analog to digital technology¹³

¹² “911 Services and Funding: Accountability and Financial Information Should Be Improved.” Legislative Research Commission, Program Review and Investigations Committee.

<https://apps.legislature.ky.gov/lrc/publications/ResearchReports/RR383.pdf>

¹³ 65.7621 Definitions for KRS 65.7621 to 65.7643. <https://apps.legislature.ky.gov/law/statutes/statute.aspx?id=45285>

3.2 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. Ensuring an effective and efficient operation long has been the goal of the Board and planning for operational effectiveness in the NG911 environment requires the Board to review current operations and plan for the changes that will come.

The MAPS tool examines nine key areas to help assess NG911 readiness:

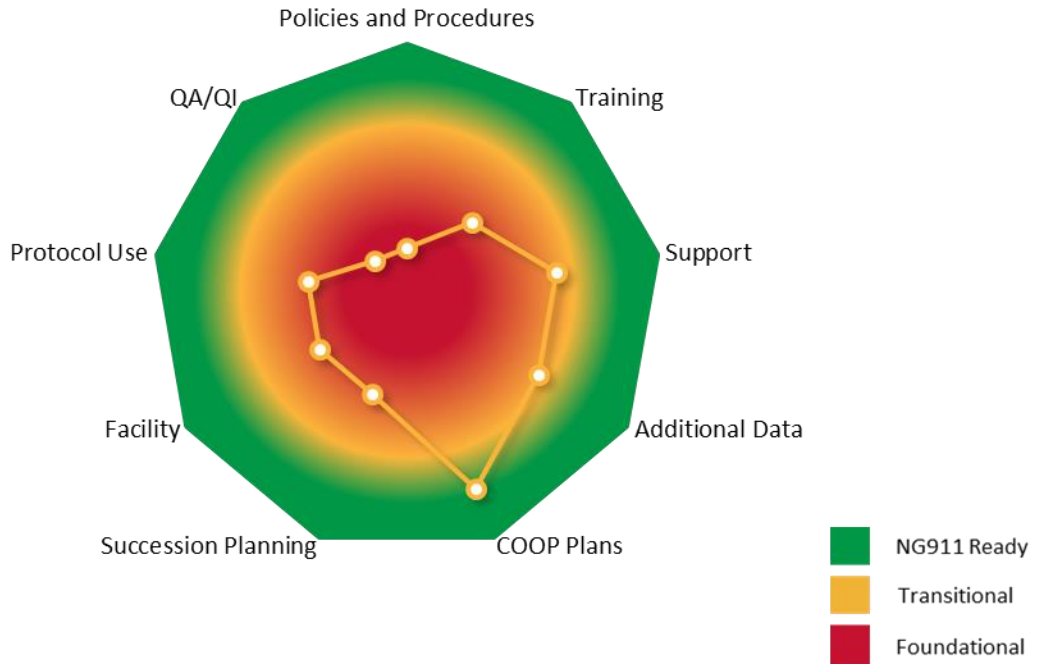
- Policies and procedures
- Training
- Support
- Additional data
- COOP plan(s)
- Succession planning
- Facility
- Protocol use
- Quality assurance/quality improvement (QA/QI)

Based on the MAPS assessment, a review of the documentation provided, and interviews with Board staff, the Board receives a comprehensive score of **4.44** for operations. This score places operations in the transitional state on the NG911 readiness continuum.

MAPSSM NG911 Readiness Assessment

Kentucky 911 Services Board

Operations



Lever	Overall Score	Policies and Procedures	Training	Support	Additional Data	COOP Plans	Succession Planning	Facility	Protocol Use	QA/QI
Operations	4.44	2.00	4.00	6.00	6.00	8.00	4.00	4.00	4.00	2.00

3.2.1 Policies and Procedures

Rating: 2.00

The Board has taken some preliminary steps to implement NG911 GIS/mapping standards but does not have and/or has not undertaken any efforts to develop or define the operational processes and procedures needed for NG911. 9-1-1 stakeholders have identified this as a priority for the Board.

While the Board does not define or dictate policies and procedures to local PSAP operations, it does certify (and recertify) PSAPs in the state.¹⁴ The certification requires that PSAPs provide documentation on:

- Agencies served
- PSAP and wireline E9-1-1 service provider agreements
- PSAP service boundaries
- PSAP networks
- Non-disclosure agreements
- Disaster recovery plans that include alternate routing plans, backup power, and evacuation procedures
- Seven-digit service for administrative non-emergency service
- Telecommunication devices for the deaf and hard of hearing in the PSAP
- Standard operating procedures (SOPs) for wireless E9-1-1 call handling

As the state works toward NG911 implementation, it will be important for the Board to have internal and external policies and procedures to help guide PSAPs to leverage the full potential of NG911.

3.2.2 Training

Rating: 4.00

Certified PSAPs are required to have every telecommunicator that handles law enforcement calls be certified per existing Commonwealth training standards. Kentucky's Department of Criminal Justice Training (DOCJT) has oversight responsibility for these standards, which are required of all full-time telecommunicators; part-time telecommunicators are exempt. The training statutes are nimble, allowing curricula needs to be updated by DOCJT staff.

Originally basic course requirements were 40 hours. Today, the required training includes telephone cardiopulmonary resuscitation (T-CPR) instruction for those who receive or dispatch emergency calls, and the curricula is 164 hours, with instruction regarding the following:

- Duties and responsibilities of a dispatcher
- Calls for service
- Phone and radio procedures
- Information systems
- Call processing

Telecommunicators attending the Public Safety Dispatch Academy are required to live on campus within the dorms.

¹⁴ 202 KAR 6:050. PSAP Certification. <https://apps.legislature.ky.gov/Law/KAR/202/006/050.pdf> and 202 KAR 6:100. **Error! Hyperlink reference not valid.** PSAP Phase II certification. <https://apps.legislature.ky.gov/Law/KAR/202/006/100.pdf>

These topics only partially meet the national minimum training guidelines. DOCJT recognizes this and sought stakeholder input to update the curriculum. This work is in progress currently.

Kentucky Law Enforcement Council-certified public safety dispatchers are required to complete eight hours of mandated training each year.

The Board recently formed an educational workgroup to focus on specific NG911 training needs. While there have been some cursory discussions regarding what NG911 training should entail, no formal plan has been established.

3.2.3 Support

Rating: 6.00

The Board is staffed to support current needs but recognizes that it is lacking the appropriate subject-matter experts (SMEs) to support an NG911 solution for the state.

3.2.4 Additional Data

Rating: 6.00

The Board does not have specific policies on the use of additional data (i.e., images, text, video, sensor data, location information, etc.). NENA defines additional data as “information which can be associated with a given emergency call, and is managed and sourced from outside the ESInet and its associated NG9-1-1 Core Services (NGCS).”¹⁵

Some PSAPs use over-the-top (OTT) applications for additional data. Each local PSAP is responsible for managing the use and storage of additional data. Under Kentucky’s records retention schedule, *Local Governments, Public Safety 911*, 9-1-1-related calls (phone or dispatch) need only be kept for 30 days.¹⁶ The policy does not address additional data or digital media.

3.2.5 Continuity of Operations (COOP) Plans

Rating: 8.00

As part of the certification process of a Kentucky PSAP, PSAPs must submit a disaster recovery plan, as opposed to a formal COOP plan with Federal Emergency Management Agency (FEMA)-defined requirements.

¹⁵ “NENA Standard for NG9-1-1 Additional Data.” NENA-STA-012.2-2017, National Emergency Number Association, section 2. <https://www.nena.org/general/custom.asp?page=standards>

¹⁶ *Local Governments, General Records Retention Schedule*. Public Safety 911. <https://kda.ky.gov/records/retentionschedules/Documents/Local%20Records%20Schedules/LocalGovernmentGeneralRecordsRetentionSchedule.pdf>

Elements of the disaster recovery plans address:

- Default routing and alternate routing of call applications or other contingency applications for rerouting calls in the event of system failure
- Type of backup power equipment installed
- Evacuation and relocation applications.

These elements are in place to mitigate service disruptions if there is a 9-1-1 service disruption or if a PSAP must evacuate their facility.

The Board recently underwent an audit of its COOP plan. The audit showed that all policies are up-to-date, and that sufficient documentation is in place for Board staff to continue with their administrative functions in the event of a crisis.

3.2.6 Succession Planning

Rating: 4.00

Board staff do have some succession planning in place. Roles and career progression are established, and some members are trained in the department to function one role up.

3.2.7 Facility

Rating: 4.00

While some diverse host facilities in the state have adequate rack space, power, cooling, and single or dual entrances, the Board still needs to identify specific requirements for facilities that could potentially host NG911 technology.

3.2.8 Protocol Use

Rating: 2.00

The Board requires that PSAPs have documented policies for the handling of wireless E9-1-1 calls.¹⁷ However, PSAPs are not required to use scripted protocols for emergency medical dispatch (EMD), emergency police dispatch (EPD), or emergency fire dispatch (EFD).

Some PSAPs have adopted the use of protocols. Agencies use a combination of third-party and agency-developed products.

¹⁷ 202 KAR 6:050. PSAP certification. <https://apps.legislature.ky.gov/law/kar/202/006/050.pdf>

3.2.9 Quality Assurance/Quality Improvement (QA/QI)

Rating: 2.00

Protocol usage is sporadic in the state as there are no legislative requirements to implement it. To implement a QA/QI program is a local decision.

The joint APCO/NENA document, *Standard for the Establishment of a Quality Assurance and Quality Improvement Program for Public Safety Answer Points*, identifies the components of a QA/QI program. The standard advises that agencies “shall establish written directives defining agency performance expectations, case review criteria, data evaluation, performance measurement criteria, documentation procedures and requirements, reporting procedures and requirements, and confidentiality rules of the QA/QI process.”¹⁸

There are no legislative requirements set forth as to the establishment of a QA/QI program or SOPs or the information that should be detailed in a QA/QI SOP.

3.3 NENA i3 Call Routing and Functional Elements

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](#), *NENA Detailed Functional and Interface Standards for the NENA i3 Solution*. 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-routing elements. The result is a broad spectrum of readiness ranging from foundational to end-state NG911.

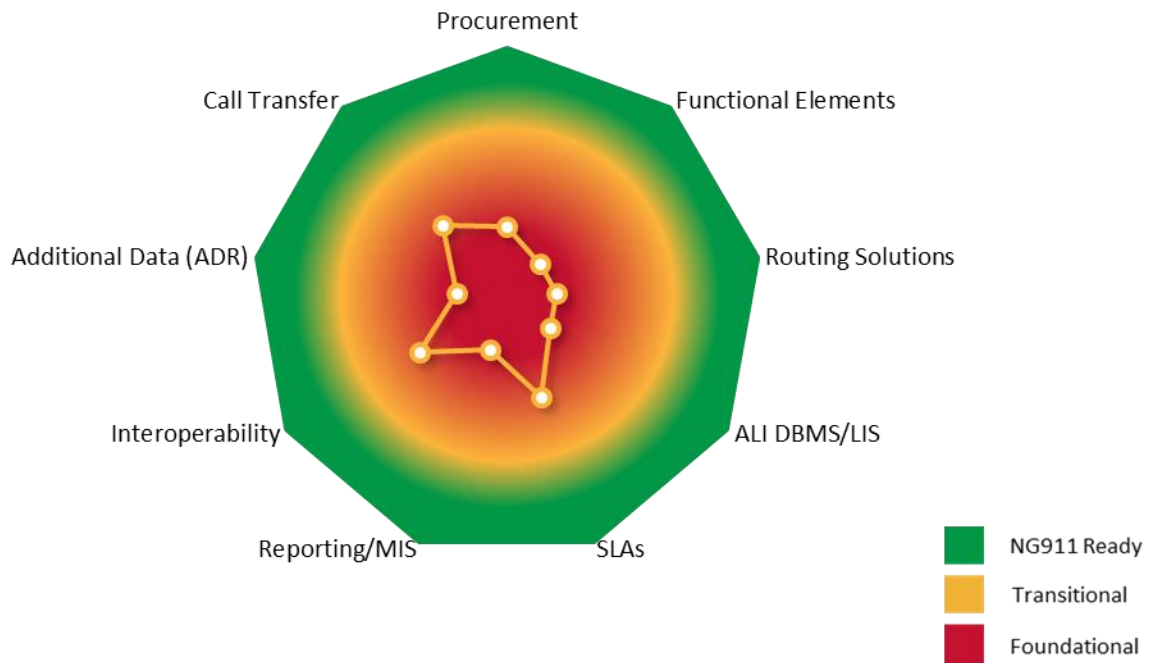
The MAPS tool examines nine key areas associated with the NENA i3 routing and functional elements to help assess NG911 readiness:

- Procurement
- Functional elements
- Routing solutions
- Automatic location identification (ALI) database management system (DBMS)/location information server (LIS)
- Service level agreements (SLAs)
- Reporting/management information system (MIS)
- Interoperability
- Additional Data Repository (ADR)
- Call transfer

¹⁸ “Standard for the Establishment of a Quality Assurance and Quality Improvement Program for Public Safety Answering Points.” APCO/NENA ANS 1.107.1.2015, APCO, section 4.3, page 21. <https://www.apcointl.org/standards/standards-to-download/>

Based on the MAPS assessment, a review of the documentation provided, and interviews with Board staff, the Board achieves a comprehensive score of **2.78** for i3 routing and functional elements. This score places the i3 routing and functional elements in the legacy (foundational) state on the NG911 readiness continuum, which is anticipated given the call-routing models currently used by PSAPs in Kentucky.

MAPSSM NG911 Readiness Assessment Kentucky 911 Services Board i3 Call Routing and Functional Elements



Lever	Overall Score	Procurement	Functional Elements	Routing Solutions	ALI DBMS/LIS	SLAs	Reporting/MIS	Interoperability	Call Transfer	Additional Data
i3 Routing and Functional Elements	2.78	3.00	2.00	2.00	2.00	4.00	2.00	4.00	2.00	4.00

3.3.1 Procurement of NG911 Call-Routing Solution(s)

Rating: 3.00

Because some regional ESInets have been deployed within the state, the Board is faced with a decision as to the best path forward to NG911. In each solution, there will be different challenges and opportunities that the Board must consider and plan for. One option is for the Commonwealth to deploy one single ESInet/NGCS solution, which would force existing regional ESInets to migrate to the newly formed statewide ESInet as soon as practical. Another option is a hybrid solution that allows those regions that have already deployed an NG911 solution or ESInet to connect to the state ESInet/NGCS solution or a third option could be to build out a statewide ESInet in phases:

- Phase 1—Deploy ESInet infrastructure to all areas not currently served by existing ESInet services
- Phase 2—Interconnect state ESInet with all regional ESInet platforms in Kentucky, testing and confirming interoperability along the way
- Phase 3 (optional)—Migrate all regional ESInets onto the state ESInet solution

Despite the current deployment of some regional ESInets within the commonwealth, a common set of guidelines or requirements for such solutions is lacking, especially regarding compliance with industry standards and interoperability.

3.3.2 Functional Elements

Rating: 2.00

Although some PSAPs are using public-safety-centric multiprotocol label switching (MPLS) networks, not all PSAPs use NGCS functional elements.

Establishing standards-based guidelines, requirements, and recommendations for the procurement of NGCS functional element solutions and services can help the Board guide the Kentucky PSAP community into a future with unified, interoperable, and industry-leading NG911 communications throughout Kentucky.

3.3.3 Routing Solutions

Rating: 2.00

Based on the [NENA 03-002](#), [NENA 03-005](#), and [NENA-STA-010.2016](#) standards, the current routing technologies used by PSAPs in Kentucky are rated as foundational. While some PSAPs do use an ESInet backbone, call routing does not yet leverage the PSAPs' high-quality GIS data to improve call routing accuracy through geospatial routing technology. Establishing a Commonwealth-level plan and timeline for the deployment of industry-standard-compliant NGCS functionality could help provide a road map and support systems to PSAPs seeking to advance 9-1-1 services across the commonwealth.

3.3.4 Automatic Location Identification (ALI) Database Management System (DBMS)/Location Information Server (LIS)

Rating: 2.00

Based on the [NENA 02-011](#) and [NENA 02-103](#) standards, ALI and Master Street Address Guide (MSAG) processes are still in place but PSAPs and the Commonwealth are taking steps toward NG911. The Board might consider developing a set of standards, requirements, and guidelines to be used by agencies within Kentucky wishing to deploy next generation incident location technology to enhance call routing accuracy and decrease call delivery times.

3.3.5 Service level agreements (SLAs)

Rating: 4.00

Strong SLAs are critical to any 9-1-1 system. Public safety agencies over the past 50 years largely have been forced to accept the level of service that the 9-1-1 system service provider—in most cases the incumbent local exchange carrier (ILEC)—was willing to provide. With the transition to NG911, procuring agencies no longer are bound by incumbent provider terms and are free to seek better solution and service options, thus leveraging a competitive market for these commodities that have not existed previously.

Whereas in a legacy environment there may be very little defined or documented for expected levels of service, NG911 offers the buyer significantly more power to define these terms. Entities procuring NG911 solutions should, at a minimum, have well-defined SLAs for mission-critical systems such as call routing and call handling.

SLAs are currently developed at the local level and are dependent on the solution (legacy or ESInet, local or regional) a PSAP has in place. These disparities can lead to different service levels in each jurisdiction. The Board should develop standard guidelines, requirements, and recommendations to guide individual PSAP procurement decisions. However, undertaking a Kentucky-wide system of NGCS could substantially magnify and amplify the PSAPs' individual ability to dictate and enforce the terms of any SLAs with which the service providers must comply.

3.3.6 Reporting/Management Information System (MIS)

Rating: 2.00

There is a near-total lack and inconsistency of service-provider reporting regarding call routing activity in Kentucky. Although PSAPs are required to provide annual call volume reports to the Board as part of their ongoing PSAP certification, this data reflects the calls that were actually delivered to the PSAPs and provides no insight into the performance and activity within the call routing infrastructure that delivers those calls. For example, there is no data to show what percentage of calls made to 9-1-1 was actually delivered to a PSAP or how long that delivery takes. This is due, in no small part, to the variety of call routing

solutions employed throughout Kentucky and the lack of a standardized statistics reporting protocol or format that is shared by all solution manufacturers.

By contrast, the call event logging specification provided by the NENA i3 standard is a uniform set of messages and message formats that all i3-compliant vendors must use for reporting on the performance and activity within their solutions, regardless of manufacturer. When combined with the i3 log event data from i3-compliant call-handling solutions, it becomes possible to reconstruct an end-to-end (cradle-to-grave) record of a call's lifecycle. Establishing universal requirements that mandate compliance with the i3 log event specification can significantly ease the generation of, and detail provided by, regular statewide call activity reports, both at the PSAP and network levels.

3.3.7 Interoperability

Rating: 4.00

A goal of NG911 is the ability to interoperate between networks (i.e., a network of networks) to bring an unprecedented level of interconnectivity for information sharing and enhanced mutual-aid support capabilities. The legacy and regional networks in use today throughout most of Kentucky rarely interconnect disparate selective routers within a given provider's network, and even more rarely when traversing multiple provider networks.

It is critical to ensure commitment to interoperability between NG911 system service providers in procurement, contract negotiations, and solutions implementation—at both the network and service level. NENA's i3 specifications make this interoperability easier by providing standards and protocols for communications between ESInets.

Even with some Kentucky PSAPs operating on regional ESInets, a lack of uniform interoperability still plagues the state's 9-1-1 systems. All PSAPs still struggle to pass ANI¹⁹/ALI across local access and transport area (LATA) boundaries and are limited to voice only transfers across regional groups and with PSAPs operating in a legacy environment.

State grant funds support regional initiatives, and interoperability is considered a high priority for grant funding; however, what is missing are policies and/or standards to address this issue. As the Board works to develop an ESInet/NGCS solution, great emphasis must be placed on the ability for PSAPs (within Kentucky and surrounding states) to transfer voice and data seamlessly. Developing standard guidelines, requirements, and recommendations that align all procured NGCS solutions with NENA's i3 specification and other industry best practices will help ensure the greatest level of interoperability between all Kentucky PSAPs and their i3-compliant neighbors. It also assures compliance with grant requirements, mitigating risks of PSAPs or the Commonwealth being non-compliant.

¹⁹ Automatic number identification

3.3.8 Additional Data Repository (ADR)

Rating: 2.00

In the current 9-1-1 environment, there is no functionality for integrated ADRs at the call routing core. However, in the NG911 ecosystem, there are a variety of ADR solutions and services providers, many of which claim that they can enhance the speed and accuracy of NGCS call routing by delivering mobile caller location faster and more accurately than mobile service providers can. Consequently, great care needs to be taken in developing standards, requirements, and recommendations for such solutions and services to ensure and verify the reliability and accuracy of the data they provide. In addition, NGCS providers need to disclose their method for deciding between conflicting caller location data that may be delivered from the Emergency Call Routing Function (ECRF)/Policy Routing Function (PRF) versus one or more ADRs.

Access to these solutions is through third-party connectivity and/or out-of-band network connections at the local PSAP CHE level.

3.3.9 Call Transfer

Rating: 4.00

Transferring calls and/or text-to-9-1-1 at this time is difficult and is limited to the service provider footprint (i.e., all PSAPs must use the same 9-1-1 service provider). Inside the service provider footprint, a PSAP can transfer ANI/ALI and text-to-9-1-1 information. However, if the call needs to be transferred outside of that footprint, PSAPs must manually relay information. This method adds delays that can prove catastrophic in some cases.

The NENA i3 specification provides many standards to ensure easy transfer of data (voice, multimedia, and other information) between solutions that are i3-compliant. Requiring compliance with the i3-specification for all NGCS solutions deployed in Kentucky can help ensure interoperability, namely call transfer capability with all available data, among all PSAPs, regardless of provider footprint or solution manufacturer.

3.4 Emergency Services Internet Protocol (IP) network (ESInet)

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

Given the transitional nature of NG911 network implementations, it is common for agencies to have ESInet facilities in place to support NG911-ready host/remote CHE and other IP-based network services. The level of redundancy in ESInet implementations varies widely, representing the full range of categories from

foundational (single point-to-point connections between sites) to redundant, resilient rings and mesh networks (end state).

The Board recognizes that the ESInet concept will incorporate a much broader scope in an NG911 environment than the solutions currently in place. The ESInet of the future may be a wholly separate network solution, designed and implemented for the purpose of supporting NGCS, or may be implemented in tandem with the hosted call-handling solution. These design decisions will be addressed at a future date and will need to be incorporated into the NG911 procurement process.

The MAPS tool examines ten key areas associated with the ESInets currently in place to help assess NG911 readiness:

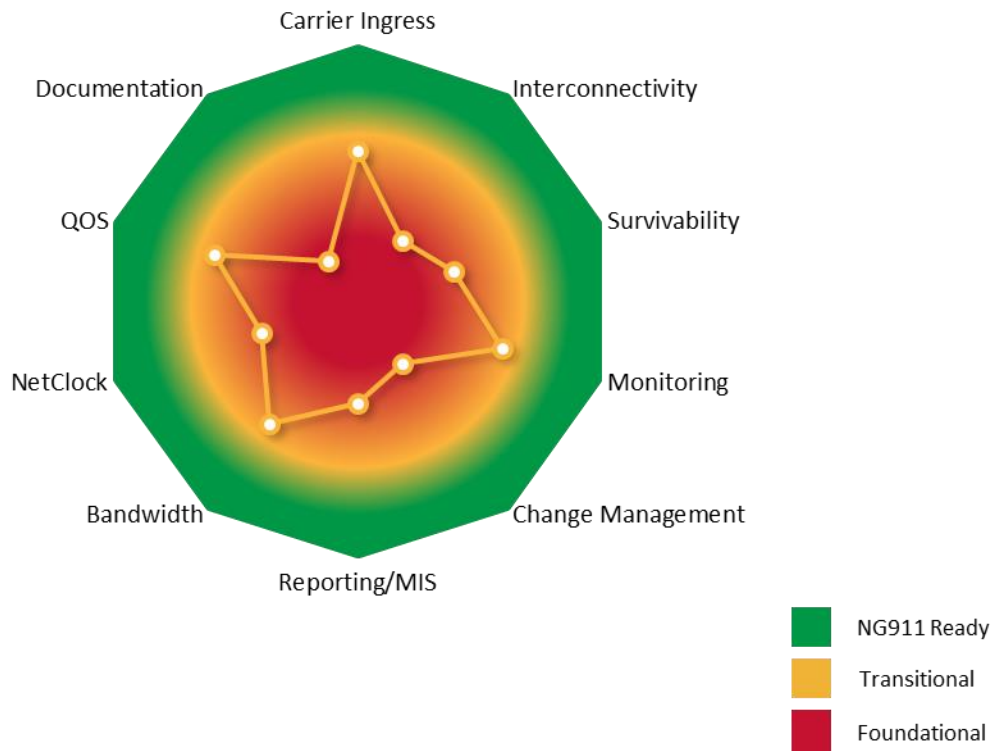
- Carrier ingress
- Interconnectivity
- Survivability
- Monitoring
- Change management
- Reporting/MIS
- Bandwidth
- NetClock
- Quality of Service (QoS)
- Documentation

Based on the MAPS assessment, a review of the documentation provided, and interviews with Board staff, the Board achieves a comprehensive score of **4.40** for the ESInet. This score places the ESInet in the transitional state on the NG911 readiness continuum, which was anticipated given the overall design and implementation of the current networks in place.

MAPSSM NG911 Readiness Assessment

Kentucky 911 Services Board

ESInet



Lever	Overall Score	Carrier Ingress	Interconnectivity	Survivability	Monitoring	Change Management	Reporting/MIS	Bandwidth	NetClock	QoS	Documentation
ESInet	4.40	6.00	3.00	4.00	6.00	3.00	4.00	6.00	4.00	6.00	2.00

3.4.1 Carrier Ingress

Rating: 6.00

Kentucky PSAPs use a mix of centralized automatic message accounting (CAMA) trunks and dedicated MPLS networks acting as regional ESInets. The Board has an end goal of migrating away from CAMA

trunks in their entirety and moving toward border control functionality for call routing. MCP acknowledges the efforts of some PSAPs to move their regions toward the i3 ideal. Nonetheless, there is still much work to be done to provide a cohesive statewide NG911 infrastructure. The Board can assume a leadership role in this evolution by working to develop shared standards, requirements, and recommendations to be used by any PSAP procuring solutions as part of the Kentucky NG911 ecosystem.

3.4.2 Interconnectivity with Neighboring ESNets

Rating: 3.00

Two of the three regional ESNets were connected via a single inter-LATA connection. This was deployed during a successful proof of concept installation but continued use of this active pathway has been terminated. While the regional ESNets have increased the ability of PSAPs to transfer both audio and data between partnering agencies, legacy customer premise equipment (CPE) solutions continue to use tandems for transfers, but only within each service provider's footprint. Definitive statements, regarding the functionality or utilization of the inter-ESNet link, are absent as is the lack of inter-provider transfer capability across the commonwealth.

3.4.3 Survivability

Rating: 4.00

The Board, while addressing some disaster recovery issues and strongly encouraging geo-diversity, does not require that PSAPs have geo-diverse connections to service provider central offices or data centers. Many PSAPs in Kentucky are rural and the acquisition of a single point of connection is challenging. Two regional ESNet groups, however, do have geo-diversity from providers into their data centers.

The Board can assume a leadership role in this evolution by working to develop shared standards, requirements, and recommendations regarding redundancy and facilities diversity to be used by any PSAP procuring solutions as part of the Kentucky NG911 ecosystem.

3.4.4 Monitoring

Rating: 6.00

The regional ESNets have 24x7 support and are monitored regularly. The PSAPs operating in a legacy environment have a mixture of support, with some systems only monitored during normal business hours (8:00 a.m. to 5:00 p.m.). Detecting problems with network outages and/or facilities is limited among some PSAPs.

In the i3 environment, the richness of logged data produced by each element in the solution provides the ability to extract much more detailed information. Much of this data is available in real- or near-real-time and is intended, specifically, for monitoring systems at work. The Board can assume a leadership role in this evolution by working to develop shared procurement requirements, recommendations, and standards

regarding solution transparency and the ability of PSAPs and the Board to monitor ESInet activity and performance, as and when they choose.

3.4.5 Change Management

Rating: 3.00

The Board does not have a formal change management process in place. This is locally established by the PSAPs with policies differing from each region and/or agency. There is no tracking mechanism in place. This makes sense, as the contracts for these services and solutions are very localized. If the Commonwealth moves ahead in procuring and deploying statewide ESInet infrastructure (or an ESInet of ESInets), the Board would have more leverage to require the provider(s) to follow a more formal change management process by establishing shared procurement requirements, recommendations, and standards. At the very least, these guidelines would address the planning, approval, notification, and other aspects of managing changes to the ESInet(s) to minimize disruptions to the PSAPs' ability to serve the public in an emergency.

3.4.6 Reporting and Management Information System (MIS)

Rating: 4.00

There is a near-total lack, and inconsistency, of service-provider reporting regarding network call routing activity in Kentucky. Although PSAPs are required to provide annual call volume reports to the Board as part of their ongoing PSAP certification, this self-reported data reflects the calls that were actually delivered to the PSAPs and provides no insight into the performance and activity within the call routing infrastructure that delivers those calls.

By contrast, the call event logging specification provided by the NENA i3 standard is a uniform set of messages and message formats that all i3-compliant vendors must use for reporting on the performance and activity within their solutions, regardless of manufacturer. When combined with the i3 log event data from i3-compliant call-handling solutions, it becomes possible to reconstruct an end-to-end (cradle-to-grave) record of a call's lifecycle. Establishing universal requirements that mandate compliance with the i3 log event specification can significantly ease the generation of, and detail provided by, regular statewide call activity reports, both at the PSAP and network levels.

3.4.7 Bandwidth

Rating: 6.00

Kentucky PSAPs use both copper lines and broadband. Even though acquisition of a connection may have been difficult for many of the rural PSAPs and may lack geo-diversity, the broadband connections are strong with only about 10% of remaining PSAPs using copper. All PSAPs in the state have access to fiber, but some have chosen not to migrate due to the inability to support recurring costs. This existing availability of fiber to each PSAP provides a tremendous opportunity to deploy high-bandwidth connections

(and, therefore, high-bandwidth applications) to all PSAPs in the state without incurring overwhelming build-out costs for facilities. Therefore, the Commonwealth seems well-positioned to establish a statewide ESInet with minimal construction delays.

3.4.8 NetClock

Rating: 4.00

The Board does not require NetClocks as part of its PSAP certification process. NetClock installation is a decision made at the local level. So, while some PSAPs do use a master clock, others do not. By contrast, in the i3 environment where so many systems are interconnected, it becomes more critical that all systems are tied to a common time source, typically the global positioning system (GPS) satellite network.

To provide short response times, fast recovery, and minimize delays in delivering mission-critical data across a statewide network, coordinated timing becomes vital. This becomes even more critical at the ESInet and NGCS level. NetClocks should be required at every NGCS facility to ensure data is not discarded due to mismatched timestamps as a result of inconsistent time sources.

Establishing universal requirements that mandate traceable timing sources (i.e., NetClocks) at each site that is connected to the ESInet (PSAP, data center, point of interconnection [POI], etc.) can significantly mitigate the risk of these timing-based errors across the state.

3.4.9 Quality of Service (QoS)

Rating: 6.00

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 9-1-1 “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.

The two regional ESInet groups do have QoS implemented across their entire networks and proactively monitor network quality. QoS is a requirement in their contracts. However, for the PSAPs on legacy networks, QoS is not applicable. As migration to NG911 occurs, Kentucky is positioned well as precedent for QoS has been set. Additionally, the Commonwealth could leverage existing QoS to ensure a consistent level of service across all regions.

3.4.10 Documentation

Rating: 2.00

Documentation of network diagrams is sparse. If a network diagram does exist it is not shared. There is a lack of documentation on network diagrams, IP address data, and configuration file backups for fallback during incidents and maintenance events.

3.5 Call-Handling Equipment

Given the local preference for CHE solutions and the cyclic nature of hardware refreshes, it is common for a state 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:

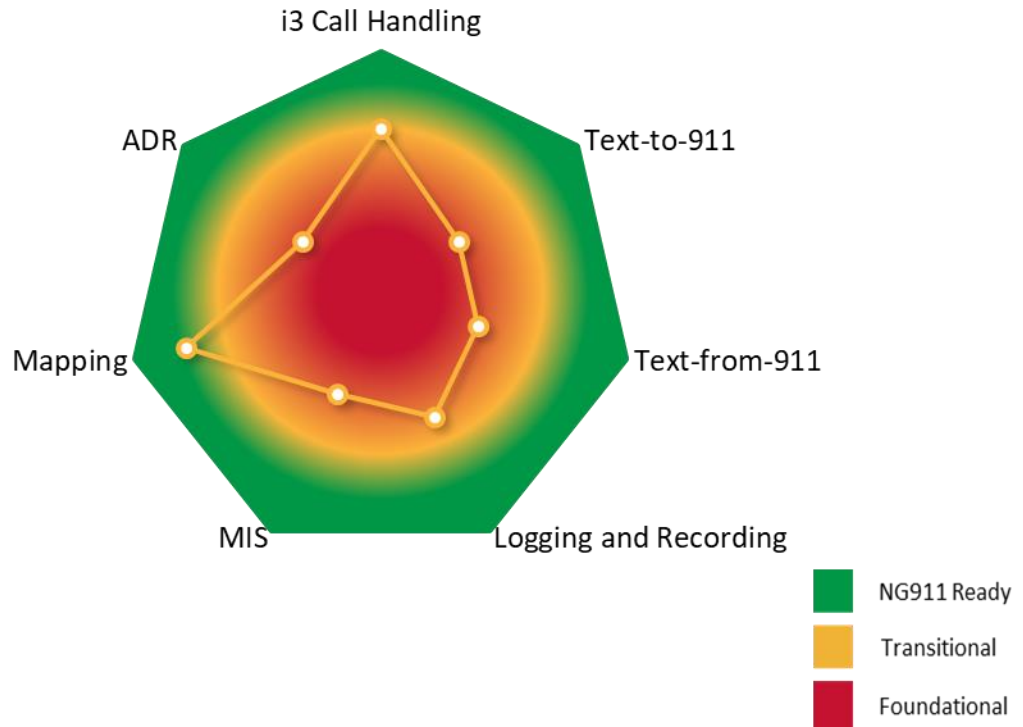
- i3 call handling
- Text-to-9-1-1
- Text-from-9-1-1
- Logging and recording
- MIS
- Mapping
- ADR

Based on the MAPS assessment, the Board achieves a comprehensive score of **5.14** for CHE. This score places CHE in the transitional state on the NG911 readiness continuum.

MAPSSM NG91-1 Readiness Assessment

Kentucky 911 Services Board

Call Handling Equipment



Lever	Overall Score	i3 Call Handling	Text-to-9-1-1	Text-from-9-1-1	Logging and Recording	MIS	Mapping	ADR
CHE	5.14	7.00	4.00	4.00	5.00	4.00	8.00	4.00

3.5.1 Call-Handling

Rating: 7.00

Under Kentucky 9-1-1 grant guidelines, PSAPs purchasing CHE equipment must ensure solutions are i3-capable. This has led to approximately 80% to 85% of PSAPs with i3 capability in place. However, under the PSAP certification requirements, there are no requirements for the types of technology a PSAP can

deploy, which has led to no statewide alignment of call-handling solutions. Whether or not the solutions themselves are the same, compliance with the i3 standards dictates common methods for accepting and sharing information between systems (beyond basic ANI in the current environment). Consequently, better and faster data is likely to shorten processing times and facilitate better response dispatch decisions.

3.5.2 Text-to-9-1-1

Rating: 4.00

Thirty-three PSAPs have deployed text-to-9-1-1, with the majority using OTT solutions. Some PSAPs still use legacy equipment and have chosen not to deploy text-to-9-1-1, even though there are solutions that can be leveraged, such as telecommunications devices for the deaf (TDD) platforms.

There is no statewide plan or any requirements of how PSAPs could deploy text. Disparate systems can lead to interoperability challenges, as PSAPs can struggle to transfer text-to-9-1-1 calls to another if they are on various platforms.

3.5.3 Text-from-9-1-1

Rating: 4.00

The same is true for PSAPs sending a text to a 9-1-1 caller. Many PSAPs using OTT solutions do have this capability, and it is encouraged. Again, the gap lies within the lack of statewide coordination or guidance on how this service should be deployed.

3.5.4 Logging Recorder

Rating: 5.00

PSAPs use a variety of recording solutions; however, there is no statewide requirement for an agency to deploy a logging recorder. Some logging recorders are considered i3-compliant, whereas others use legacy-type equipment.

Absent basic i3-compliance, the legacy recording solutions 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.

3.5.5 Management Information System (MIS)

Rating: 4.00

All call volume is self-reported annually to the Board as part of the PSAP certification requirements. Localities must break out call metrics to measure the number of wireless, VoIP, and landline 9-1-1 calls

received. Various platforms are in use and there is no requirement that equipment be ready to capture i3 log events.

3.5.6 Mapping

Rating: 8.00

Kentucky has taken great strides in preparing GIS data for an NG911 environment. As such, every PSAP is required to have a mapping solution that supports needed i3 functionality such as zooming, depicting circles of uncertainty, and imagery support. Statewide coordination of this effort has been strong. Locally though, PSAPs admit that due to lack of resources they sometimes struggle to keep data current and updated.

3.5.7 Additional Data Repository (ADR)

Rating: 4.00

When data is made available to telecommunicators early and throughout the 9-1-1 call, situational awareness improves—which can result in quicker 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 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.

At this time, at least 33 counties have implemented some type of text-to-9-1-1 solution. Kentucky is also in the procurement process to implement a PSAP portal at each agency. The PSAP portal is an OTT solution that will be integrated at every PSAP to link various additional data solutions together. This solution will allow PSAPs to transfer and interchange data regardless of the service provider. This OTT model constitutes a transitional approach to ADR integration. The data provided by ADRs generally is used as supplemental information to inform telecommunicators, as opposed to making call-routing decisions.

3.6 Security

Public safety agencies use both TFOPA and NIST standards/recommendations as a framework to build a successful cybersecurity management process.

[NIST Special Publication 800-53](#), *Security and Privacy Controls for Information Systems and Organizations*, 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 to manage cybersecurity risks
2. Protect—develop and implement appropriate safeguards

3. Detect—develop and implement activities to identify a cybersecurity event.
4. Respond—develop and implement activities to mitigate a detected threat
5. Recover—develop and implement plans for restoring services due to an incident²⁰.

TFOPA's *NG9-1-1 Readiness Scorecard*, section 4.4, *Security*, identifies six comprehensive steps for creating a cybersecurity plan.

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/Evaluate—monitor and examine operational environments
5. Test /Evaluate—audit and verify findings
6. Improve/Evolve—reassess and reevaluate policies, procedures and security controls

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:

- Cyber plan/policy
- Proactive monitoring
- Risk assessment
- Physical assessment
- Logical security
- Staff security

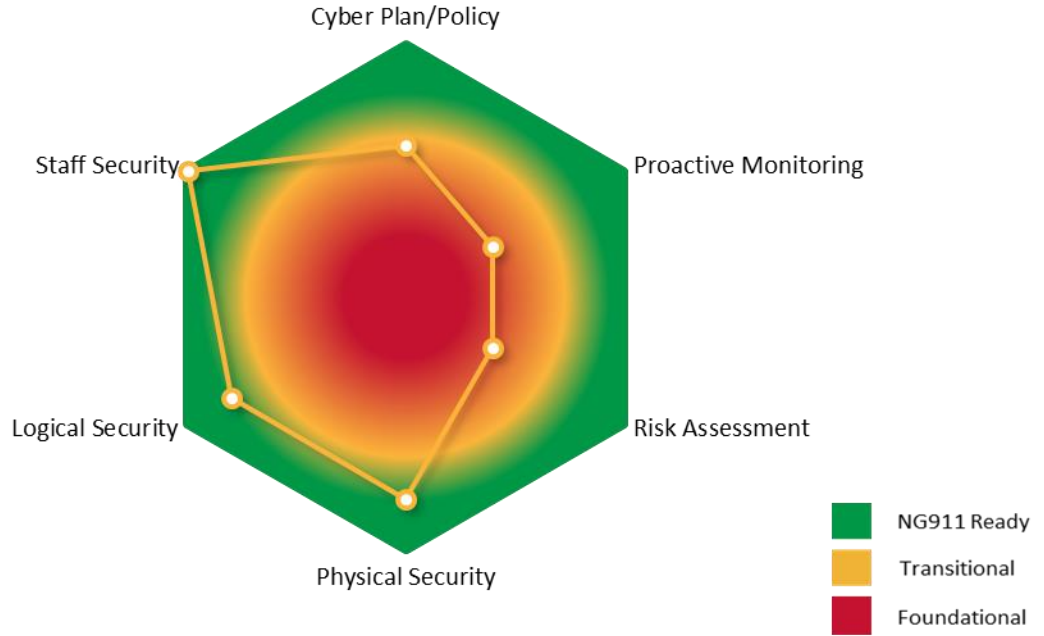
Based on the MAPS assessment, the Board achieves a comprehensive score of **6.67** for security. This score places security in the transitional state on the NG911 readiness continuum.

²⁰ <https://csrc.nist.gov/publications/detail/sp/800-53/rev-4/final>, NIST Special Publication 800-53, *Recommended Security Controls for Federal Information Systems and Organizations*

MAPSSM NG911 Readiness Assessment

Kentucky 911 Services Board

Security



Lever	Overall Score	Cyber Plan/Policy	Proactive Monitoring	Risk Assessment	Physical Security	Logical Security	Staff Security
Security	6.67	6.00	4.00	4.00	8.00	8.00	10.0

3.6.1 Cyber Plan/Policy

Rating: 6.00

The Board's operational information technology (IT) policies are derived from the Commonwealth Office of Technology (COT).²¹ The COT is responsible for all Commonwealth agencies that operate on the state network. The state network and policies are very robust. The COT actively oversees cybersecurity policies.

There is no overarching entity responsible for a state plan to include individual PSAPs. The Board recognizes this and has plans to ensure that cybersecurity policies and best practices are adopted as part of the NG911 road map.

3.6.2 Proactive Monitoring

Rating: 4.00

The COT does not share its detailed policies surrounding network monitoring. However, the Board recognizes that when the Commonwealth deploys or secures a statewide ESInet specific parameters to ensure equipment connecting to the state network meets COT and TFOPA standards will be required.

Today, local PSAPs depend upon their governing jurisdiction policies and resources regarding monitoring. This leaves some PSAPs more vulnerable than others.

Interestingly, Kentucky PSAPs have little insight into service provider outages. There are no outage notification requirements for service providers outside what is federally mandated. This places 9-1-1 services within Kentucky at a great disadvantage. Furthermore, the legacy landscape does not provide the Board with the ability to monitor statewide from a single point of view. As such, there is no active monitoring from the state-level.

3.6.3 Risk Assessment

Rating: 4.00

The COT has conducted a cybersecurity risk and vulnerability assessment for Commonwealth agencies. The COT has strong policies and procedures in place. Due to COT's assessment capabilities, the state is in a strong position if the Board were to adopt or deploy a statewide ESInet.

Localities must conduct their own risk assessments. PSAP certification requirements do not require PSAPs to have a tested cybersecurity plan nor can the Board set local cybersecurity requirements.

²¹ Commonwealth Office of Technology. Ky.gov. <https://technology.ky.gov/Pages/default.aspx>

3.6.4 Physical Security

Rating: 8.00

The Board campus and staff areas require badged access. If the Board procures a statewide ESInet, it will require the service provider to have security compliant with NENA NG-SEC standards and COT requirements for all personnel and equipment. These controls are good examples of physical security measures.

Based on the policies and awareness for the protection of assets and personnel, the Board must require the same or greater level of physical security protections from its NG911 system service provider for systems and data provided to the state and it must maintain NG-SEC compliance.

Locally, PSAPs that use Criminal Justice Information Services (CJIS) must follow specifications for physical and network security. This includes limiting access to secure areas of buildings or escorting and logging guests' access.

3.6.5 Logical Security

Rating: 8.00

Current Board infrastructure is managed by the COT. If Kentucky procures a statewide ESInet, it will require the service provider to have NG-SEC compliant security for all personnel and equipment. These protections and/or increased security posture must be in place for all future NG911 systems procured by the Board. These requirements should be in alignment with Board-defined policies and procedures or through legislated mandate for all systems interfacing with the NG911 solution in the state.

3.6.6 Staff Security

Rating: 10.0

Access to the Board facility is limited; electronic badge access is required or guests must be escorted. Contractors may get badge access but rarely are subcontractors rendered to perform maintenance on the state network. Criminal history background checks are additionally required to be granted badge access.

3.7 Geographic Information Systems (GIS)

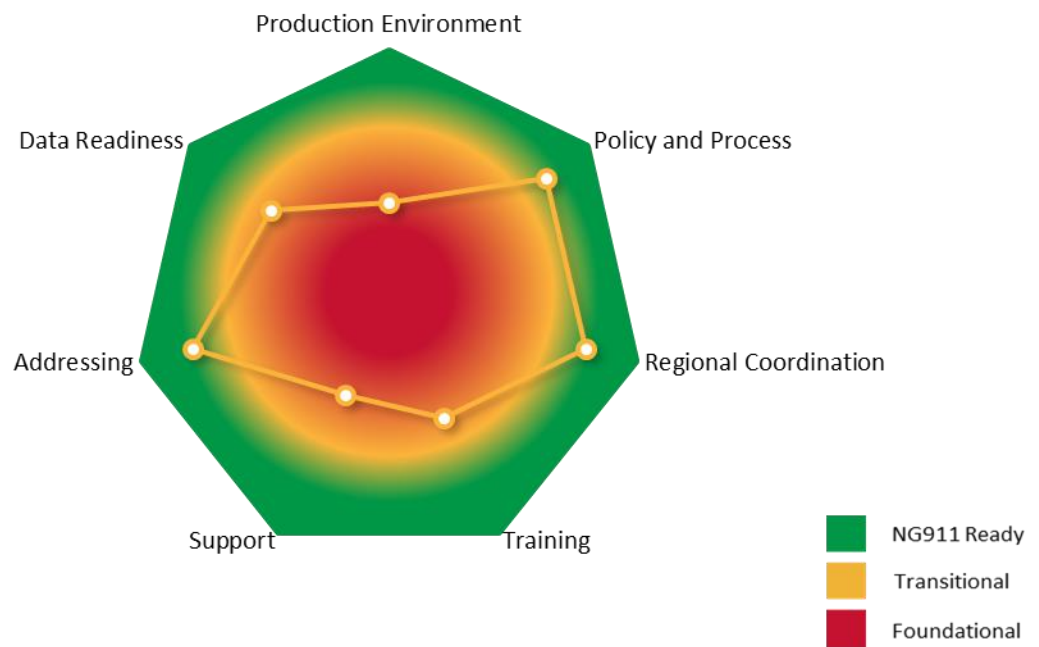
The development of GIS datasets to meet NG911 requirements is time-consuming and complex. The best GIS data is secured and maintained at the local (i.e. county, city) level, which requires a coordinated effort to compile into a single statewide configuration. Given this preference for local development, Board guidance and support is essential for successful NG911 integration.

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

- Production environment
- Policies and processes
- Regional coordination
- Training
- Support
- Addressing
- Data readiness

Based on the MAPS assessment, the Board achieves a comprehensive score of **6.14** for GIS. This score places GIS in the transitional state on the NG911 readiness continuum.

MAPSSM NG911 Readiness Assessment Kentucky 911 Services Board GIS



Lever	Overall Score	Production Environment	Policy and Process	Regional Coordination	Training	Support	Addressing	Data Readiness
GIS	6.14	4.00	8.00	8.00	5.00	4.00	8.00	6.00

3.7.1 Production Environment

Rating: 4.00

The Board has coordinated with COT's Division of Geographic Information (DGI) and the Board's Advisory Council to define GIS requirements for certified PSAPs. PSAPs are required by KAR, and outlined within the Board's [Kentucky NG911 Mapping Guide](#), to develop and submit files quarterly for the following:

- Emergency service boundary (ESB)
- PSAP boundary
- Road centerlines

Localities create these files independently and then submit them to the Commonwealth within required timelines. Traditionally, DGI serves as the gatekeeper and assists the Board with data review and analysis. Currently, Kentucky is undergoing a procurement process to develop a cloud-hosted solution to accept GIS data from the various localities, perform quality reviews, and develop statewide NG911-compliant datasets.

The Advisory Council is developing standards and requirements for NG911-compliant Site/Structure Address Point (SSAP) collection and submittal as part of the PSAP certification process.

3.7.2 Policies and Processes

Rating: 8.00

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*.

As part of the process, local GIS data must be audited to ensure that it meets standards. The Board has produced an in-depth brochure, *Kentucky NG911 Mapping Guide*, that provides detailed examples of correct and incorrect data submission formats.

Further policies and processes documentation will need to be developed in concert with upcoming Board-initiated GIS data submittal and aggregation solutions.

3.7.3 Regional Coordination

Rating: 8.00

The Board, in partnership with DGI, has worked to address gaps with PSAP boundary edges, ESBs, and PSAP-to-PSAP road centerlines. The Board has developed formal agreements for local data submittals, sponsored regional training regarding data collection and submittals, and has nurtured a close working partnership and process with the localities.

3.7.4 Training

Rating: 5.00

Recently the Board hired an internal GIS staff member. Prior to this, the Board used third-party resources, such as DGI and consultants, to assist with GIS-related support. While the Commonwealth does provide some GIS training, the primary focus is on PSAP boundaries and how to submit data. The Board foresees that GIS training and education will improve with their addition of a dedicated resource and required solution-specific training provided by the selected GIS integration provider.

3.7.5 Support

Rating: 4.00

The Board provides limited GIS support to PSAPs and until recently was reliant on DGI and consultants for technical and operational GIS guidance.

3.7.6 Addressing

Rating: 8.00

The control of address assignment is delegated to local city, county or regional authorities and is not within the Board's purview. However, the Board's certification process does require each PSAP to define the local method for address assignment, collection, and maintenance within their PSAP dispatching area. Additionally, the Board requires that addressing data used for dispatching corresponds with actual address assignments in the field. The Board performs related audits before PSAP certification to ensure addressing data is integrated into the local 9-1-1 system.

The Board is developing minimum standards for SSAP data layer submittal and formatting to be integrated within the present GIS data guidelines.

3.7.7 Data Readiness

Rating: 6.00

The Board does not evaluate ALI/MSAG data, but the Board does review the readiness of the polygon and road centerline submittals. Beginning in 2021, the Board will begin a readiness assessment on address points upon the required submittals from each PSAP. The stated Board standard is evaluated to 90% for location accuracy and completeness. The Commonwealth conducts geoaudits upon local PSAP data and PSAP mapping systems upon certification and may execute additional geoaudits as warranted.

4 Considerations and Implications

4.1 Planning and Communications

There are many NG911 goals, objectives, and tasks underway that are acknowledged within the Board's NG911 Road Map, which lays out the plan forward with measurable goals and timelines. However, development and execution of an implementation plan, as well as processes to keep the plan updated, will allow the Board to track progress once tasks are completed.

Board staff admitted that it is sometimes hard to make objective decisions based on data. While Kentucky does have some reporting requirements in place, the information is self-reported by PSAPs annually. A lack of visibility into the health of Kentucky's PSAPs has made planning difficult as each locality and region is unique and often operate differently.

As part of the strategic plan, a formalized, communications strategy should be developed to help educate and inform stakeholders about the NG911 initiative, project tasks and milestones, and any possible impacts that can be expected throughout the transition. Participants of the strategic planning sessions identified that strengthening communications, and delivering messages consistently is their number one priority

4.2 Operations, Standards, Policies, and Procedures

The Board has the authority to set PSAP certification requirements; however, these requirements are focused on E9-1-1 and do not currently include NG911-centric operational issues. And while the Board has taken some preliminary steps toward the implementation of NG911 (i.e., GIS/mapping standards) it has not yet undertaken any efforts to develop or define the operational processes and procedures needed for NG911.

Interviewed 9-1-1 stakeholders identified this as a priority for the Board and are looking for the Board to take the lead and develop updated PSAP certification requirements to include best practices or guidance documents to assist PSAPs with issues such as cybersecurity, call routing, operations, data maintenance, QA/QI, and training to name a few.

4.3 Funding

Kentucky collects 9-1-1 funds in several manners. Local 9-1-1 fees are collected by each jurisdiction, which can set its own rates and collection method. These fees have traditionally been placed on landline phones (including VoIP) but cannot be levied upon wireless devices. The Commonwealth determines the wireless 9-1-1 fee rates, collection, and disbursement method.

The revenue generated by the local and wireless fees still leaves many, if not most PSAPs underfunded. Many jurisdictions must additionally fund 9-1-1 services through other means, which may result in

disparities of service. Funding will be needed not just for NG911 implementation but ensuring current 9-1-1 systems are maintained.

4.4 Technology and Cybersecurity

The Board must determine the best path forward for NG911 in the state; for example, one single ESInet/NGCS solution, a hybrid solution that allows those regions that have already deployed NG911 components to connect to a state ESInet/NGCS solution or a multi-regional NG911 approach. In each solution, there will be different challenges and opportunities that must be considered and planned for.

While regions have worked together to address interoperability challenges, a holistic approach to interoperability in the state is lacking. PSAPs still struggle to transfer 9-1-1 calls across LATA boundaries or among regional ESInet solutions. The Commonwealth has begun talks with surrounding states but has not developed a formalized plan or strategy to address state-to-state interoperability.

Legacy 9-1-1 and NG911 leave PSAPs vulnerable to cybersecurity attacks. As technology is deployed, the Commonwealth will need to develop standards and best practices for cybersecurity to protect the network and PSAPs that reside on it.

4.5 Training

Kentucky's telecommunicator program today meets the needs of the legacy 9-1-1 environment but needs to be enhanced for NG911. As more types of digital media become available to public safety telecommunicators, training on how to process these calls will need to be created, as well as on the different technologies. Additionally, exposure to digital media will likely introduce significant new stress to the telecommunicator. It will be paramount that telecommunicators receive dedicated training on stress management.

5 Recommendations

This section includes recommendations for resolving challenges that the Board faces 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.

5.1 Governance

Kentucky has been planning for NG911 for 11 years. However, the MAPS assessment revealed that a process is not in place to measure success against the plan, how to update the plan or to communicate consistently to stakeholders. Developing a road map and communicating progress or the status of

initiatives will continue to improve the trust between Board staff and the 9-1-1 community. Leveraging the expertise from the 9-1-1 community will allow the Board to ensure they are in alignment with their needs.

Additionally, while the Board has discussed some preliminary costs for NG911 and understands that there will be some funding gaps, Kentucky would be best served to conduct a full-scale funding study to develop a procurement strategy and how it will develop a sustainable funding model.

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

Table 1: Governance Recommendations

Category	Recommendations
Documentation	<ul style="list-style-type: none"> • Create a charter for the Advisory Council • Create charters for each working group/committee to identify the committees' purpose
Strategic Planning	<ul style="list-style-type: none"> • Finalize the road map • Develop benchmarks and a reporting mechanism for communicating progress toward the plan • Continue to engage stakeholders and seek their input into the plan
Communication	<ul style="list-style-type: none"> • Create a communications plan among the Board, the Advisory Council, stakeholders, and PSAPs using a variety of communications tools • Update and maintain the Board website
Coordination	<ul style="list-style-type: none"> • Create an NG911 interoperability working group/subcommittee to plan and address interoperability issues in the state • Continue to engage in discussion with surrounding states for NG911 planning • Follow principles in the <i>Next Generation 911 (NG911) Interstate Playbook</i>²²
Technology	<ul style="list-style-type: none"> • Develop structure and guidelines for the role the Commonwealth will play in developing technical requirements • Engage the Advisory Council and education/technical committee in the development of request for proposal (RFP) requirements and technical reviews of proposed NG911 solutions
Budget	<ul style="list-style-type: none"> • Conduct a funding study to determine costs for transition to an NG911 solution • Communicate funding requirements.

²² "Next Generation 911 Interstate Playbook." https://www.911.gov/project_nextgeneration911interstateplaybook.html

Category	Recommendations
	<ul style="list-style-type: none"> Use the results of the funding study to determine NG911 procurement options and ongoing sustainability of funding
Funding	<ul style="list-style-type: none"> Develop a sustainable funding model
Staffing	<ul style="list-style-type: none"> Add technical SME to assist with the planning and procurement of ESInet and NGCS components
Procurement	<ul style="list-style-type: none"> None
Standards and Best Practices	<ul style="list-style-type: none"> Engage stakeholders in developing technical, operational, and training standards and best practices Identify and prioritize what standards and best practices should be created Define what a requirement, standard, policy, and procedure versus best practice and their impacts on the PSAPs

5.2 Operations

NG911 will require much coordination and collaboration. PSAPs look to the Board to take the lead and provide guidance for the operational and technical challenges that face the state. The MAPS assessment revealed that requirements, policies and procedures, and best practices need to be updated, captured, or created on a diverse range of topics (security, training, COOP, interoperability, etc.). Engaging stakeholders to be the drivers of solutions is key in creating the buy-in for the adoption and update of mandates.

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

Table 2: Operations Recommendations

Category	Recommendations
Policies and Procedures	<ul style="list-style-type: none"> Update governance documents to clarify NG911 requirements, policies, and best practices for effective NG911 operations Update the PSAP certification requirements to include NG911 functionality Solicit feedback from PSAP stakeholders to identify and prioritize what requirements, policies, and best practices they seek Engage subcommittees to help develop requirements, policies, and best practices

Category	Recommendations
Training	<ul style="list-style-type: none"> • Ensure state training standards meet the <i>Recommend Minimum Training Guidelines for the Telecommunicator</i>²³ • Develop NG911 training requirements, policies, and best practices • Conduct NG911 internal and external training • Conduct an internal needs analysis to assess gaps in staff skillsets and seek training to augment the current knowledge base • Include stress training specific to NG911 • Conduct external training needs analysis to identify the needs of the PSAP community
Support	<ul style="list-style-type: none"> • Determine gaps in training and skills to address through additional training and mentoring
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 address additional data that is collected • Review guidance and best practices for NG911 applicability
COOPs	<ul style="list-style-type: none"> • Engage staff and stakeholders to develop a comprehensive COOP template for PSAP agencies that are aligned with FEMA recommendations, including an annual review process • Expand PSAP requirements to include COOP plan as part of the certification process
Succession Planning	<ul style="list-style-type: none"> • Develop a succession plan and update regularly • Conduct training for staff members to function in a role that is one above their position for emergency backup, succession training, and to increase organizational depth • Cross-train staff (to the degree feasible) to augment current staff shortages until additional staff is acquired
Facility	<ul style="list-style-type: none"> • Identify the specific requirements for facility hosting of NG911 technology

²³ “Recommended 911 Minimum Training for Telecommunicators.” 911.gov.
https://www.911.gov/project_recommended911minimumtrainingfortelecommunicators.html

5.3 NENA i3 Call Routing and Functional Elements

While many PSAPs do leverage some transitional call routing functions, many PSAPs still operate in a legacy environment. The first step Kentucky must take is to identify its procurement strategy and identify its path for the best way to accomplish end-state NG911. Once this most important step is taken, it will help Kentucky identify if these requirements should be incorporated into an RFP document or should become standards or best practices at a governance level.

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

Table 3: i3 Routing and Functional Elements Recommendations

Category	Recommendations
Procurement	<ul style="list-style-type: none"> Identify the solution for the Board to move the state toward end-state NG911
Functional Elements	<ul style="list-style-type: none"> Define technical and operational requirements that include the ability to support transitional and end-state i3 requirements
Routing Solutions	<ul style="list-style-type: none"> Define technical and operational requirements for i3-compliant call routing that is compatible with legacy, transitional, and end-state solutions
ALI DBMS/LIS	<ul style="list-style-type: none"> Define technical and operational requirements for DBMS and location databases to support transitional and i3 LIS
SLAs	<ul style="list-style-type: none"> Define and document strong SLAs encompassing both ESInet and NGCS components for the following (but not limited to): high reliability and availability, defects and replacements, and response/notification/repair
Reporting/MIS	<ul style="list-style-type: none"> Define and incorporate operational requirements for reporting and MIS, allowing visibility of system health and metric tracking at both the state and local level Define and document minimum NG911 reporting metrics and/or reports, including formatting and frequency
Interoperability	<ul style="list-style-type: none"> Identify technical requirements that specify inoperability with legacy, transitional, and i3-compliant solutions Ensure appropriate policies/legislation are in place to support (intra and inter) statewide interoperability
ADR	<ul style="list-style-type: none"> Define technical and operational requirements to incorporate ADRs and LIS information
Call Transfer	<ul style="list-style-type: none"> Define technical and operational requirements for the ability to transfer voice and data that includes ANI/ALI, text, audio, video, and other data

5.4 Emergency Services Internet Protocol (IP) networks (ESInet)

Recognizing that an ESInet can serve a variety of purposes for public safety telecommunications—call handling, call routing, CAD, or a hybrid of all these solutions—first, identify items that may improve upon the existing networks in service. Second, identify items that focus on future needs for an ESInet to support NGCS routing functions.

The recommendations below identify some of the key requirements for a standards-based and future-proof ESInet.

Table 4: ESInet Recommendations

Category	Recommendations
Carrier Ingress	<ul style="list-style-type: none"> Define requirements to support both legacy telephony connections (via a legacy network gateway [LNG]) as well as multi-modal IP interfaces for ingress of next generation content, primarily via Session Initiation Protocol (SIP) (e.g., SMS, VoIP, Internet of Things [IoT], remote alarm and sensor messages, etc.)
Interconnectivity	<ul style="list-style-type: none"> Create a strategic plan for migrating PSAPs off legacy selective routers. The plan should include: <ul style="list-style-type: none"> Requirements to support interoperability and interconnectivity with other i3 ESInets as well as with legacy selective routers (LSRs) (via legacy selective router gateways [LSRGs]), to ensure continued interoperability and cooperation with agencies still served by LSRs Requirements to support legacy PSAP gateways (LPGs) to allow non-i3-compliant PSAP CHE to connect to the ESInet, leveraging the capabilities of the NG911 infrastructure to the greatest extent possible
Survivability	<ul style="list-style-type: none"> Develop requirements to address survivability, redundancy, security, and resiliency based on industry standards and best practices
Monitoring	<ul style="list-style-type: none"> Create/Develop a solution that will offer the Commonwealth a near-real-time operational picture of the activity and performance of the ESInet; this could include alerts, notifications and/or a statewide map-based dashboard
Change Management	<ul style="list-style-type: none"> If the Commonwealth moves forward with procurement of a statewide ESInet solution, a structured change management process should be included in the development of the RFP requirements. The process should include: <ul style="list-style-type: none"> Change proposal to include change justification, expected outcome, estimated time and cost Approval process to include input from the Board Implementation plan to include contingency/back-out procedures

Category	Recommendations
	<ul style="list-style-type: none"> – Post-change review (after-action analysis and lessons learned)
Reporting/MIS	<ul style="list-style-type: none"> • Develop reporting requirements that align with the i3 log event specification to ease the generation of, and detail provided by, regular statewide call activity reports, both at the PSAP and network levels
Bandwidth	<ul style="list-style-type: none"> • Conduct outreach to PSAPs to understand the challenges of migrating to public safety appropriate broadband connections
NetClock	<ul style="list-style-type: none"> • If the Commonwealth moves forward with procurement of a statewide ESInet solution, include local traceable time sources (typically GPS-based) at each ESInet connected facility
QoS	<ul style="list-style-type: none"> • Develop statewide requirements of network traffic classifications and prioritizations
Documentation	<ul style="list-style-type: none"> • If the Commonwealth moves forward with procurement of a statewide ESInet solution, requirements should include: <ul style="list-style-type: none"> – A complete and accurate package of as-built documents at each significant project milestone and a commitment to providing updates to this documentation as the project evolves – A complete set of user documentation for all applications, programs, portals, and tools to which Commonwealth or PSAP end-users have access – A documented set of procedures (including issue escalation) and contact information for reporting issues and accessing support resources 24x7

5.5 Call-Handling Equipment

Kentucky should be applauded for having CHE requirements tied to grant funding. However, a gap still exists as there are no requirements at a statewide level to ensure PSAPs are selecting equipment that is i3-ready or can support interoperability. Having baseline requirements would still give flexibility to local PSAPs to choose the vendor solution that best fits their needs but also ensure i3 readiness and interoperability. The Board, instead of using grant funds to drive this, could develop a statewide CHE contract vehicle with a selection of pre-vetted solutions available at pre-negotiated pricing.

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

Table 5: CHE Recommendations

Category	Recommendations
I3 Call-Handling	<ul style="list-style-type: none"> • Determining if CHE requirements should be part of PSAP certification requirements or just part of the grant funding • Engage PSAP operational/technical SMEs to determine operational and functional requirements that will address the varied PSAP needs across the state • Require compliance with the latest NENA i3 functional specifications
Text-to-9-1-1/Text-from-9-1-1	<ul style="list-style-type: none"> • Create and communicate a statewide plan for text-to-9-1-1 deployment • Engage PSAP operations personnel to develop standards and best practices around text-to-9-1-1 and text-from-9-1-1
Logging Recorder	<ul style="list-style-type: none"> • Require logging recorders to support capture of traditional voice (phone or radio) as well as IP-based audio • Ensure logging recorders support i3 log events for collecting metadata
MIS	<ul style="list-style-type: none"> • Create policies surrounding state-level aggregation, analysis, and use of MIS data from PSAPs • Develop requirements to ensure MIS solutions support capture of and reporting against NG911 data formats, including EIDO²⁴, i3 log events, and ADR
Mapping	<ul style="list-style-type: none"> • Require GIS data submitted to the Board for PSAP certification to be used within the PSAP or integrated within the CHE solution.
ADR	<ul style="list-style-type: none"> • Engage PSAP personnel to identify all external data sources in use today and determine which ones are aligned with NENA i3 specifications • Ensure CHE requirements can support, at minimum, these same data sources natively • Develop security policies regarding access to third-party ADRs from untrusted providers

5.6 Security

The focus of the security recommendations is to ensure that local PSAPs have enough awareness and controls in place to help identify threats. Generally, it is accepted that the ESInet and NGCS provider be tasked with ensuring industry compliance with standards and best practices. Yet, the lack of statewide guidance leaves not just each locality vulnerable to cybersecurity attacks, but also each region. Kentucky’s COT requirements position the state well if the Commonwealth were to implement a statewide ESInet. The

²⁴ Emergency Incident Data Object

area of improvement focuses more on the lack of documentation or defined requirements regarding security.

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

Table 6: Security Recommendations

Category	Recommendations
Cyber Plan/Policy	<ul style="list-style-type: none"> • Develop a statewide NG911 cyber plan based on TFOPA principles • Consider including a cyber plan as part of PSAP certification requirements • Engage PSAP personnel to create cyber requirements
Proactive Monitoring	<ul style="list-style-type: none"> • Ensure, if the Commonwealth moves forward with procurement of a statewide ESInet solution, end-to-end monitoring of the ESInet and NGCS • Define system health • Develop requirements ensuring regions monitor system health • Require regions to report on system health
Risk Assessment	<ul style="list-style-type: none"> • Require local security and audits prior to establishing connectivity to statewide ESInet
Physical Security	<ul style="list-style-type: none"> • Develop requirements to ensure physical security in compliance with Kentucky COT mandates
Logical Security	<ul style="list-style-type: none"> • Develop requirements to ensure logical security in compliance with Kentucky COT mandates
Staff Security	<ul style="list-style-type: none"> • Develop requirements to ensure staff security in compliance with Kentucky COT mandates

5.7 Geographic Information Systems (GIS)

Kentucky’s concentrated effort to develop an NG911 GIS foundation before other aspects of the NG911 ecosystem is reflected in the progress the Board has achieved in this area. The integration of GIS requirements within PSAP certification, the pursuit of statewide GIS development solutions, and the intentional placement of resources have enabled the Board to foster the mature state of GIS for NG911. However, a continual effort is required to capture the existing progress while finalizing the remaining phases to achieve full NG911 ready status. Permanent success is dependent on finalizing the long-term support required to update, maintain, and integrate the datasets used for routing emergency requests within an NG911 system.

The recommendations below are designed to help Kentucky improve its GIS capabilities for an NG911 environment.

Table 7: GIS Recommendations

Category	Recommendations
Production Environment	<ul style="list-style-type: none"> Continue to encourage locally developed NG911-compliant GIS datasets
Policies and Processes	<ul style="list-style-type: none"> Refine standards for data submittal and usage
Regional Coordination	<ul style="list-style-type: none"> Continue support of regional collaboration of data development and distribution
Training	<ul style="list-style-type: none"> Develop ongoing GIS training opportunities supporting the 9-1-1 community
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"> Finalize addressing guidelines and regulations supporting NG911 requirements
Data Readiness	<ul style="list-style-type: none"> Finalize data aggregation solution to provide statewide data sets

6 Conclusion

The Board has taken many steps to plan for the transition to NG911, with the MAPS assessment revealing that elements range from legacy to foundational to transitional states. Kentucky has taken a “GIS first” approach to NG911 as it is recognized that GIS is a cornerstone of NG911 implementation. However, as Kentucky moves forward, not only should it keep technology at its forefront but also the impacts on public safety telecommunicators and how to address them.